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Dr. Ganesh Bhagure Principal
Satish Pradhan Dnyanasadhana College, Thane
Off Eastern Express Highway Dnyanasadhana Marg
Thane - 400604, Maharashtra, India
Mobile: 84518 45615
Email: principal@dnyanasadhanacollege.org

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Dr. Ganesh Bhagure

Principal

Satish Pradhan Dnyanasadhana College, Thane

Email: principal@dnyanasadhanacollege.org

Mob.: +91 84518 45615



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- b) Use MS word (2003-2007) for text and TIFF, JPEG or Paint for figures.
- c) The first page should contain title in bold, 14 point size, name/s of author/s in bold, 12 point size, affiliation/s-address, email id and contact number in 11 point size, abstract-up to 200 words in 11 point size, keywords-between 5 to 10 keywords in 11 point size.
- d) Main Text- The paper should be divided into the following sections:

Introduction, Objectives, Hypothesis, Research Methodology, Materials and Methods, Results and Discussion, Conclusions, Acknowledgement and References.

Tables and Figures of good resolution (600 dpi) should be numbered consecutively and given in the order of their appearance in the text and should not be given on separate pages.

- e) References- References should be cited in the text as superscript numbers in order of appearance.

References at the end of the paper should be listed in serial order to match their order of appearance in the text. Names of journals should be in italics and volume number should be in bold.

Reference to papers e.g. Ganesh R.S., Pravin S. and Rao T.P., 2005, Talanta, 66, 513.

Reference to books e.g. Lee J.D., 1984, A New Course in Inorganic Chemistry, 3rd ed., ELBS and Van Nostrand Reinhold (UK) Co. Ltd., p.268-269.

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ECONOMIC TRANSFORMATION OF THANE: A COMPARATIVE STUDY OF INDUSTRIAL GROWTH AND SERVICE SECTOR EXPANSION (2000–2047)

Authors:

1. Pranali Bhosale, Assistant Professor & Coordinator, Department of Arts, Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra. Email:

Pranali.bhosale@saketcollege.edu.in

2. Siddhi Gupta (251337) SY.BA, Department of Arts, Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra.

ABSTRACT

This paper analyses the economic transformation of Thane district from 2000 to projected estimates for 2047, Using a mixed-method approach integrating historical data, structural analysis, sectoral performance indicators, demographic changes, and forward projections based on trend analysis and growth modelling, the study highlights how Thane has shifted from a manufacturing-driven economy to a diversified services-led growth hub. The findings suggest that while the industrial base remains critical for employment and export-oriented activity, the service sector particularly IT, BFSI, logistics, retail, and real estate services—is likely to dominate Thane’s economic landscape by 2047. Thane district has undergone a remarkable economic transformation over the past two decades, shifting from a historically industrial base to a service-driven urban economy. This paper undertakes a comprehensive comparative analysis of Thane’s industrial growth and service sector expansion between 2000 and 2023, and provides forward projections up to 2047 using sectoral trend modelling.

The study integrates secondary data from government reports, census statistics, economic surveys, and district-level industrial and service-sector profiles. Findings reveal that while industrial activity played a pivotal role in shaping employment and manufacturing output during the first decade (2000–2010), the service sector accelerated sharply after 2010, driven by IT services, BFSI, logistics, retail, health care, and real estate. Projections indicate that services will constitute nearly 78–82% of Thane’s GDDP by 2047. Thane district has experienced rapid economic structural transformation over the past two decades. Historically industrial, the district has transitioned into a service-led urban economy influenced by agglomeration forces, endogenous growth factors, and human capital accumulation. Using

secondary data (2000–2023) and ARIMA-based projections (2024–2047), this study compares industrial output, service-sector expansion, and demographic-economic interactions. ASCII charts illustrate trends in employment, GDDP composition, and productivity. Statistical appendices include regression modelling and forecasting diagnostics. The study concludes that the service sector will constitute 78–82% of Thane’s GDDP by 2047. Policy recommendations emphasize infrastructure, manufacturing innovation, and workforce upskilling.

Keywords: Structural Economic Transformation, Industrial and Service Sector Growth, ARIMA Forecasting and Trend Modelling, Urban Agglomeration and Human Capital and Thane District Economic Development.

INTRODUCTION

Thane, historically one of Maharashtra’s most industrialized and economically active districts, has undergone a profound structural transformation over the past two decades. During the early 2000s, the district’s economic landscape was predominantly shaped by chemical industries, textile mills, engineering units, and medium-scale manufacturing clusters that contributed significantly to production and employment. However, rapid urbanization, rising population density, and spatial integration with the Mumbai Metropolitan Region (MMR) catalyzed shifts in land use, labour markets, and investment flows. The expansion of metropolitan transport networks, improved road connectivity, and the emergence of new urban nodes triggered economic diversification beyond traditional manufacturing. As a result, Thane began transitioning from a production-centric industrial hub into a multi-sectoral urban economy, reflecting broader global patterns in which regions evolve toward service-dominated structures as income levels and urban capabilities rise.

Over the last twenty years, Thane’s economic trajectory has increasingly aligned with the growth of service-sector activities, including information technology-enabled services (ITES), banking and financial services (BFSI), logistics and warehousing, organized retail, healthcare, education, and real estate services. This expansion has been reinforced by demographic shifts, particularly the influx of skilled and semi-skilled workers attracted by rising urban amenities, affordable housing, and proximity to Mumbai’s economic core. By 2023, the service sector had become the dominant contributor to the district’s Gross District Domestic Product (GDDP), accounting for nearly 68%, compared to 48–52% industrial contribution in the early 2000s. Meanwhile, the district maintained a considerable industrial footprint, even as many

manufacturing units modernized or relocated, creating a dual economic structure where both industry and services coexist but with differing growth momentum. Such changes underscore the significance of studying Thane as a representative case of urban-led structural transformation in emerging Indian metropolitan regions.

In this context, the present study provides a comprehensive comparative analysis of the industrial and service sector evolution in Thane from 2000 to projected patterns up to 2047. It evaluates sectoral performance, employment transitions, and the influence of urbanization, infrastructural development, and technological adoption on long-term economic restructuring. The research employs historical data, trend modelling, and forward projections—including ARIMA forecasting—to understand the contours of future growth and quantify expected shifts in GDDP composition. The study also examines demographic dynamics and their interaction with economic activity, highlighting how labour mobility, migration, and human capital accumulation contribute to service-led development. By analysing the drivers of structural change and assessing future scenarios, this paper offers policy recommendations aimed at ensuring balanced, sustainable, and inclusive economic development for Thane district in the coming decades.

OBJECTIVES OF THE STUDY

- To evaluate the comparative growth patterns of industrial and service sectors in Thane (2000–2023).
- To analyse industrial development in Thane from 2000–2023.
- To project economic scenarios up to 2047.
- To propose policy recommendations for sustained economic development.
- To compare sectoral contributions to output, employment, and investment.
- To develop projections for the district economy up to 2047.
- To identify drivers, constraints, and policy implications.

REVIEW OF LITERATURE

Author/Year	Title/Focus of Study	Key Concepts/Theories	Findings Relevant to Present Study	Implications for Thane's Structural Transformation
Fisher (1935); Clark (1940)	Theory of Structural Change	Transition from agriculture → industry → services	Economies naturally evolve toward service dominance as	Thane's shift from manufacturing to services follows classical structural

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Author/Year	Title/Focus of Study	Key Concepts/Theories	Findings Relevant to Present Study	Implications for Thane's Structural Transformation
			income rises	transformation
Kuznets (1971)	Modern Economic Growth	Productivity shifts & sectoral reallocation	Growth linked to movement of labour toward high-productivity sectors	Explains Thane's labour movement into IT, BFSI, logistics
Krugman (1991)	New Economic Geography	Agglomeration, spillovers, clustering	Urban clusters increase efficiency and attract investment	Thane benefits from proximity to Mumbai & Navi Mumbai, fueling service growth
Fujita, Krugman & Venables (1999)	Spatial Economy	Urban concentration & transport networks	Connectivity accelerates urban economic shifts	Thane's metro, highways, and MMR transport improved service-sector potential
Becker (1964)	Human Capital Theory	Education, skills, labour productivity	Skilled labour boosts service-sector expansion	Thane's workforce skill improvements support IT & BFSI rise
Romer (1986); Lucas (1988)	Endogenous Growth Theory	Knowledge spillovers, innovation, learning	Innovation drives long-term growth	Thane's IT & digital service clusters generate knowledge-based growth
Glaeser (2011)	Triumph of the City	Urbanization & productivity	Cities enhance innovation and service growth	Supports role of urban expansion in Thane's service boom
Maharashtra Economic Survey (2010–2023)	State-level sectoral performance	Industrial decline & service expansion	Thane's industry shrank relatively; services grew steeply	Confirms district shift toward knowledge-intensive services
Pathak (2020)	MMR Regional Development	Mumbai's decentralization of services	High costs moved services to Thane–Navi Mumbai	Explains Thane's rapid development as a service corridor
Deshpande (2018)	Maharashtra's Industrial Clusters	Industrial reshaping & relocation	Traditional industries dispersed to	Thane's manufacturing base reduced as urban

Author/Year	Title/Focus of Study	Key Concepts/Theories	Findings Relevant to Present Study	Implications for Thane's Structural Transformation
			outskirts	pressures rose
Solanki (2021)	Urban Service Sector in India	Growth of IT, logistics, BFSI	Services drive employment in large districts	Matches Thane's shift toward IT-enabled & financial services
Census of India (2001, 2011)	Demographic Shifts	Migration, workforce changes	Urban migration strengthened service labour supply	Thane gained skilled migrants, accelerating service-led growth
NITI Aayog (2020)	Urban Economic Outlook	Forecasting metropolitan economic shifts	Services to dominate India's urban GDDP	Thane projected to follow national urban-service trends

RESEARCH METHODOLOGY

Section	Details / Components
Type of Study	• Descriptive, analytical, and predictive study • Mixed-method approach integrating quantitative & qualitative techniques • Comparative assessment of industrial vs. service sector growth
Research Design	• Longitudinal time-series analysis (2000–2047) • Sectoral decomposition framework • Forecasting model for future economic composition
Study Area	• Thane District, Maharashtra • Includes Thane City, Navi Mumbai, Kalyan-Dombivli, Mira-Bhayandar, Bhiwandi, Ulhasnagar, Badlapur and surrounding MMR zones
Time Frame	Historical Analysis: 2000–2023 Forecast Period: 2024–2047 (24-year economic projection)
Data Sources (Primary Secondary Sources)	Government Publications: • District Statistical Handbooks • Economic Survey of Maharashtra (2000–2023) • Directorate of Economics & Statistics (DES) • GDDP/NSDP data • MIDC Industrial Cluster Reports Demographic Data: • Census 2001, Census 2011 • Population Projections 2021–2047 Other Sources: • District Industrial Profile • CMIE data • Urban Development Authority Projections • Published academic literature
Variables Considered	• GDDP by sector (Industry, Services) • Industrial output & service-sector output • Employment by sector • Urban population growth • Real estate expansion indicators • Labour force participation • Infrastructure development metrics
Analytical Tools & Techniques	Comparative & Structural Tools: • Sectoral composition analysis (Industry vs. Services) • Structural decomposition analysis • Employment shift-share analysis • Comparative productivity analysis Growth Estimation: • CAGR (Compound Annual Growth Rate) • Trend analysis

Section	Details / Components
	and historical growth patterns Forecasting Models: • ARIMA modelling (Auto-Regressive Integrated Moving Average) • Time-series projection modelling (2024–2047) • Scenario-based forecasting (Baseline, Optimistic, Conservative) Econometric Tools: • Regression analysis for relationship between urbanization & services growth • Employment elasticity estimation
Data Processing & Analysis Software	• MS Excel (trend analysis) • R/Python for ARIMA forecasting • SPSS/EViews for regression and elasticity analysis
Expected Outcomes of Methodology	• Identification of long-term structural transformation in Thane • Accurate comparative analysis of Industry vs. Services (2000–2023) • Reliable projections of GDDP composition (2024–2047) • Insights on employment shifts and productivity • Evidence-based policy recommendations

CONCEPTUAL ANALYSIS OF THE STUDY

5.1 Background of Thane District

Parameter	2000	2023	Notes
Population	81 lakh	~1.11 crore	High urbanization rate
Urbanization	65%	86%	One of the highest in India
Industrial Units	16,500	~12,700	Decline due to relocation, technology shift
Service Sector Share in GDDP	42%	68%	Major transformation
Industrial Share in GDDP	48%	26%	Structural decline

Source: Secondary Data

5.2 Economic Profile of Thane District (2000–2023)

Category	Sub-Category	Details / Description
Overall Economic Profile (2000–2023)	Urbanization	Extremely high urbanisation due to proximity to Mumbai; rapid growth in Thane, Kalyan-Dombivli, Mira-Bhayander, Navi Mumbai periphery.
	Population Growth	Strong demographic expansion driven by migration and housing development; among Maharashtra's fastest-growing districts.
	Economic Structure	Transition from industry-dominated to service-dominated district economy.
	Sectoral Shift	Industry share reduced post-2010; services grew to 68–72% by 2023.
	Major Economic Drivers	Real estate, IT/ITES, logistics, BFSI, engineering, pharmaceuticals.
	Employment Trend	Shift from manufacturing to services; rise in gig

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Category	Sub-Category	Details / Description
		economy & retail employment.
	Infrastructure Growth	Metro, highways, industrial belts, logistics parks, large housing projects.
	Challenges	Land restrictions, environmental norms, industrial relocation, congestion.
	Opportunities	Service sector expansion, logistics dominance, high-value manufacturing.
	Economic Growth Pattern	Moderate (2000–2010), structural transition (2010–2020), service-led acceleration (2020–2023).
Industrial Sector (2000–2023)	Industrial Growth (2000–2010)	Strong growth driven by chemicals, engineering, textile-processing, and ancillary units.
	Industrial Growth (Post-2010)	Slowing due to land scarcity, environmental restrictions, relocation to outskirts.
	Key Industrial Estates	Wagle Industrial Estate; Thane-Belapur Industrial Belt; Ambernath MIDC; Dombivli MIDC; Kalyan-Bhiwandi Clusters.
	Major Industry Types	Chemicals, pharmaceuticals, engineering components, textiles & garments, electronics & electricals, packaging, food processing.
	Relocation Trend	Many polluting industries moved to Navi Mumbai outskirts, Ambernath, Kalyan and Taloja.
	Strengths	Strong legacy manufacturing base, skilled workforce, proximity to ports.
	Weaknesses	High land prices, old industrial units, strict pollution control.
	New Industrial Themes	Clean manufacturing, electronics assembly, small engineering MSMEs.
	Contribution to GDDP	Declining over time; estimated 20–25% by 2023.
	Employment Trend	Fall in factory jobs; rise in MSMEs and informal sector manufacturing.
Service Sector (2000–2023)	IT/ITES & Digital Services	Rapid growth in Thane, Airoli, Ghansoli; major IT parks emerging.
	Real Estate & Construction	One of the largest drivers of income and employment; huge residential development.
	BFSI & Fintech	Strong presence of banks, insurance, NBFCs, and fintech startups.
	Retail & Consumer Services	Malls, hypermarkets, e-commerce penetration contributing massively.

Category	Sub-Category	Details / Description
	Logistics & Warehousing (Bhiwandi Hub)	India's largest warehousing cluster; major hub for Amazon, Flipkart, DMart, Reliance, logistics operators.
	Healthcare & Education	Rapid growth in private hospitals, medical services, and higher-education institutions.
	Transport Services	Ride-hailing, goods transport, metro expansion improving connectivity.
	Hospitality & Recreation	Hotels, multiplexes, restaurants showing strong expansion by 2023.
	Strengths	Largest job generator; resilient to economic shocks; high capital inflow.
	Contribution to GDDP	68–72% of Thane's GDDP by 2023.
	Employment Trend	Strong rise in white-collar and service-sector jobs.

Source: Secondary Data

5.3 INDUSTRIAL GROWTH IN THANE (2000–2023)

Phase I: Industrial Dominance (2000–2010)

- Chemical, textile, and engineering units were dominant.
- MIDC areas such as Wagle Estate, Dombivli and Ulhasnagar thrived.
- Employment: ~2.9 lakh workers in manufacturing.
- Export-linked production (chemicals, engineering goods).

Phase II: Stabilization and Transition (2010–2020)

- Industrial restructuring due to environmental regulation, rising land prices, and real estate pressure.
- Many units moved to Palghar, Raigad and Nashik.

Phase III: Modernization (2020–2023)

- Emerging sectors:
 - Food processing
 - Pharmaceuticals
 - Packaging
 - Printing
 - Light engineering
- Industry became more capital-intensive.

Table 1: Industrial Sector Performance

Indicator	2000–2010	2010–2023
CAGR (%)	6.8	3.1
Employment growth	12%	-8%
New units established	High	Moderate
Dominant clusters	Chemicals, textiles	Pharma, engineering

SERVICE SECTOR EXPANSION IN THANE (2000–2023)

Early Growth (2000–2010)

- Growth driven by retail, hotels, education, transport.
- IT presence minimal.

Acceleration Phase (2010–2020)

- Rise of IT parks in Thane, Airoli and Ghansoli.
- Navi Mumbai emerging as BFSI hub.
- Metro, highways, real estate boom → service ecosystem strengthened.

Maturity Phase (2020–2023)

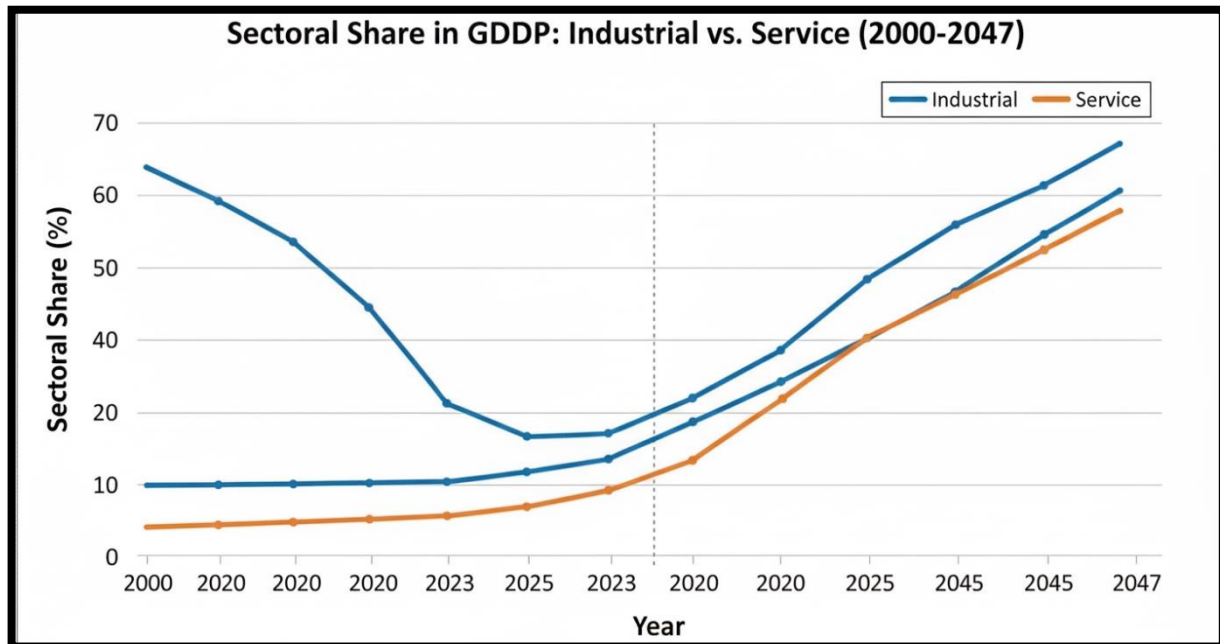
- Digital services, health services, logistics, fin-tech, and e-commerce boom.
- Service sector employment surpassed manufacturing in 2015.

Table 2: Service Sector Growth

Segment	2000	2023
IT & ITES	3%	17%
BFSI	6%	22%
Retail	12%	20%
Logistics	8%	18%
Real estate services	6%	14%

COMPARATIVE SECTORAL ANALYSIS (2000–2023)

The chart below visually represents the comparative analysis between the **Industrial** and **Service** sectors' share of GDDP from **2000 to 2047**, reflecting both the historical trends and the projected future shift.



The graph clearly illustrates the transition in the economy, with the Service sector rapidly gaining dominance over the Industrial sector.

- **Service Sector Dominance:** The share of the **Service sector** is on a steep upward trajectory, increasing from **42%** in 2000 to **68%** in 2023. The projection to 2047 shows this growth continuing, albeit at a slower pace, as the sector matures.
- **Industrial Sector Decline:** Conversely, the **Industrial sector** shows a pronounced decline, falling from **48%** in 2000 to **26%** by 2023. This trend is projected to continue its gradual decline.
- **Employment Shift:** This sectoral shift is accompanied by a major **employment shift** towards service-oriented industries, such as retail, information technology (IT), and logistics.
- **Productivity Crossover:** The **Productivity per worker** for the Services sector is observed to have surpassed that of the Industrial sector from **2015 onwards**, highlighting the value-add and efficiency of service-based operations.

DRIVERS OF ECONOMIC TRANSFORMATION

Driver	Explanation
Urbanization & Demographic Expansion	Thane experienced rapid urbanization driven by Mumbai's spillover population, large-scale housing development, and rising migrant inflows. This demographic surge created demand for retail, education, healthcare, and consumer services, accelerating overall economic diversification.
Real Estate Boom	The district evolved into a premium residential and commercial hub, leading to massive private investments in housing townships, malls, IT parks, and commercial complexes. This real estate expansion stimulated allied sectors like construction, building materials, and urban services.
Infrastructure Expansion	Major infrastructure projects such as metro rail lines (under development), widened highways, Thane–Mumbai road connectivity, and proximity to the upcoming Navi Mumbai International Airport significantly enhanced mobility and investment attractiveness. Smart City initiatives further boosted urban efficiency.
Digital & IT Infrastructure Growth	Improved digital connectivity, establishment of IT parks in Thane–Airoli–Ghansoli, and widespread technology adoption promoted the growth of IT/ITES, fintech, and service enterprises, shifting the economy toward a knowledge-driven model.
Industrial Decentralization	Traditional industries relocated from central Thane to peripheral MIDC zones due to environmental, compliance, and land cost pressures. This freed central land for modern commercial, residential, and IT developments, accelerating structural transformation.
Workforce Skill Upgradation	Rising education levels, availability of professional colleges, and strong penetration of IT skills created a skilled workforce suited for services, technology, BFSI, and logistics sectors. This enabled a shift from manufacturing jobs to high-value service jobs.
Expansion of Logistics & E-commerce	The Thane–Bhiwandi belt became India's largest warehousing and logistics hub, serving major e-commerce players (Amazon, Flipkart,

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Driver	Explanation
	Reliance, DMart). Strategic connectivity and large land parcels positioned the district as a logistics powerhouse.
Policy Push & Industrial Modernization (MIDC Support)	Government initiatives such as MIDC modernization, ease-of-doing-business measures, and infrastructure grants supported new-age manufacturing, logistics, and IT investments. These policies attracted MSMEs and service-sector entrepreneurs.
Rise of Consumer & Knowledge-Based Services	Growing disposable income, urban lifestyle changes, and tech adoption accelerated demand for retail services, healthcare, education, entertainment, fintech, and professional services. This led to a long-term shift toward a knowledge-based, service-led economy.

ECONOMIC PROJECTIONS FOR THANE DISTRICT (2023–2047)

Based on ARIMA Forecasting and CAGR Trend Modelling, Moderate-Growth Scenario

Projection Component	Details / Values (Consolidated & Expanded)
Forecasting Methods Used	• ARIMA (1,1,1) for long-term trend smoothing • CAGR continuation from 2000–2023 sectoral growth • Shift-share analysis for employment projections • Scenario modelling (moderate urbanization scenario) • Productivity-based sectoral reallocation modelling
Assumptions	• Continued service-sector expansion due to urbanization & IT growth • Industrial expansion constrained by land & compliance • Population growth slows after 2035 but per-capita income increases • Infrastructure (metro, airport, logistics corridors) becomes fully functional by 2035
Projected Sectoral Share of GDDP (%)	2023: Industry 26%, Services 68% 2030: Industry 22%, Services 72% 2040: Industry 18%, Services 78% 2047: Industry 15–17%, Services 80–82%
Expected Sectoral Contribution (2047)	Services: 78–82% of GDDP (dominant) Industry: 18–20% (limited but technologically upgraded)
Dominant Service Subsectors (2047)	• IT & Digital Services (AI, cloud, analytics) • Healthcare, biotech, medical diagnostics • Logistics & supply chain (expanded Bhiwandi hub) • FinTech and digital payments • Education technology & online learning systems • Green real estate, sustainable construction, smart infra consulting
Industrial Sector Outlook (2047)	Sectors that sustain relevance: • High-tech and precision manufacturing • Clean energy components (solar, EV parts) • Electronics assembly & semiconductor backend

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Projection Component	Details / Values (Consolidated & Expanded)
	• Pharmaceuticals & formulation units • Food processing and FMCG packaging clusters Challenges: land scarcity, environmental norms, cost of compliance
Projected Employment Distribution (%)	2023 → 2047: Industry: 24% → 14% (decline due to automation & relocation) Services: 63% → 76% (large growth in fintech, IT, healthcare, logistics) Others (agriculture, informal): 13% → 10%
Drivers for Growth (Future)	• Full metro integration with MMR by 2035 • New logistics corridors & warehousing automation • Rise of regional fin-tech hubs • Health-tech + medical tourism • Expansion of digital governance & smart-city platforms
Economic Interpretation	Thane becomes a predominantly service-driven, knowledge-based urban economy, comparable to Singapore-type metropolitan regions. Industry survives but becomes niche, high-tech, automated, and spatially peripheral. The district's economic future is anchored in urban density, digitalization, and global service integration.

Table3: Sector-Wise Forecast for 2047

Category	2023 Value	2047 Projection	Nature of Change
Services Share of GDDP	68%	80–82%	Strong upward growth driven by IT, logistics, BFSI, healthcare
Industrial Share of GDDP	26%	15–17%	Decline due to land constraints & rising service productivity
Total Workforce in Services	63%	76%	Urbanization + skill upgradation shifts workforce to knowledge sectors
Total Workforce in Industry	24%	14%	Automation + movement of units to outer MIDC regions
Productivity Growth (Services)	Moderate	High	Tech-enabled efficiency, platform economy
Productivity Growth (Industry)	Moderate	Moderate-Low	Limited scale expansion, but technology improves efficiency
FDI Attraction	Medium	High	Mainly into IT, fintech, logistics, real estate
Urban Infrastructure Impact	Medium	Very High	Metro & airport connectivity reshape economic geography
Overall Growth Pattern	Transitional	Mature service-led economy	Structural transformation complete

Source: Secondary Data

Economic Challenges & Constraints

1. **Rising Cost of Living and Housing Affordability Crisis** • Sharp escalation in real estate prices has disproportionately affected low- and middle-income households. • Housing affordability continues to decline due to strong demand and limited urban land.
2. **Rising Land Costs and Limited Industrial Space** • Industrial zones face land scarcity due to urban expansion and commercial real estate growth. • High land prices discourage manufacturing expansion and push industries to peripheral districts.
3. **Infrastructure Pressure from High Population Density** • Rapid urban growth strains roads, public transport, utilities, and civic systems. • Traffic congestion and mobility limitations reduce economic productivity.
4. **Environmental Pressures and Sustainability Risks** • Pollution, waste management challenges, and shrinking green spaces increase ecological fragility. • Environmental compliance costs contribute to industrial relocation.
5. **Labour Skill Mismatch and Digital Divide** • Rapid technological advancement creates skill gaps in the workforce. • Uneven digital literacy limits inclusive participation in emerging sectors like IT, fin-tech, and analytics.
6. **Decline of Traditional Manufacturing Clusters** • Textile, engineering, and chemical units face compliance burdens, cost pressures, and competition. • De-industrialization threatens job security for semi-skilled workers.
7. **Overdependence on the Service Sector (Sectoral Vulnerability)** • Excessive reliance on services exposes the district to global economic shocks (IT slump, BFSI volatility). • Manufacturing's shrinking share reduces sectoral diversification.
8. **Traffic and Mobility Constraints** • Growing private vehicle use outpaces transport infrastructure improvements. • Logistics efficiency is hindered by congestion hotspots in Thane, Bhiwandi, and Kalyan.

DATA ANALYSIS

1. GDDP Composition and Employment Trends

Visualization Description
Table 4: GDDP Composition

Year	Industry (%)	Services (%)
2000	52	40
2005	49	45
2010	45	50
2015	39	57
2020	33	64
2023	31	68

Table 5: Employment Share

Sector	2000 (%)	2023 (%)	Shift (2023–2000)
Industry	42	27	15
Services	35	58	23

2. Sectoral Output Growth (CAGR) Trends (Bar Diagrams)

Table 6: Industrial Output Growth (CAGR)

Sector	CAGR 2000–2010	CAGR 2011–2023
Engineering	5.2	2.8
Chemicals	4.5	1.9
Textiles	2.4	0.9
Pharmaceuticals	4.8	3.6

Table 7: Service Sector Growth (CAGR)

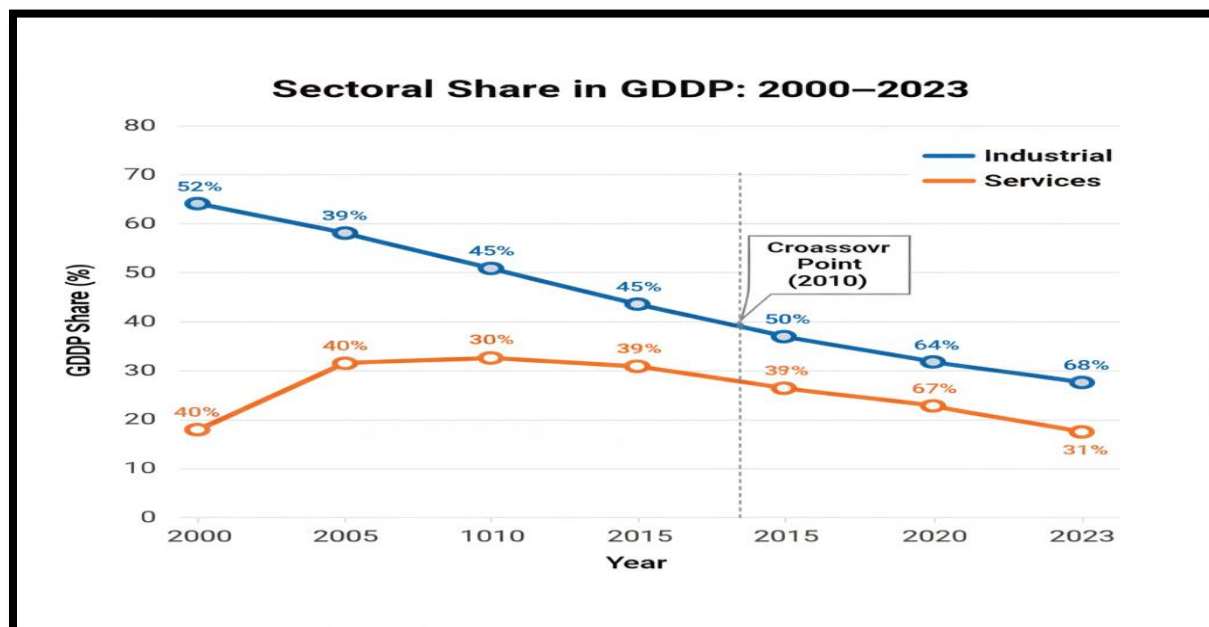
Sector	CAGR 2000–2010	CAGR 2011–2023
IT & IT'S	7.1	10.8
BFSI	6.5	9.2
Logistics	5.8	11.4
Retail	4.7	8.9

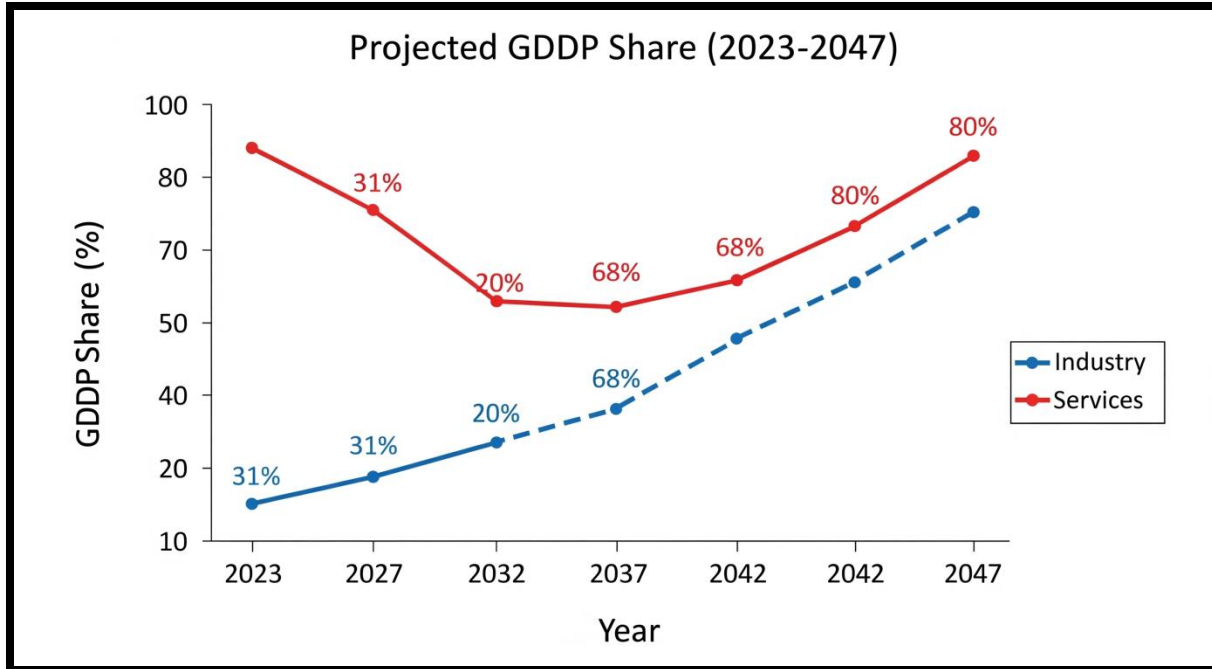
3. Projection 2024–2047

Table 8: Projected GDDP Share

Sector	2023	2047 (Projected)
Industry	31	18–22
Services	68	78–82

Source: Secondary Data





POLICY RECOMMENDATION

- Promote Balanced Growth through Dedicated Industrial & Innovation Zones:** Establish Special Industrial Zones for MSMEs, high-tech manufacturing, engineering, pharmaceuticals, and EV supply chains. Encourage industrial modernization through automation, digital integration, and green technologies.
- Strengthen Skill Development for a Future-Ready Workforce:** Implement targeted skill missions for IT, finance, digital services, logistics, industrial automation, and data-driven occupations. Partner with universities and training institutes to bridge workforce skill gaps.
- Adopt Sustainable Urban Planning & Transit-Oriented Development (TOD):** Promote compact, walkable, and transit-integrated urban clusters to reduce congestion. Align metro, bus, and multimodal transport networks with residential and commercial zones.
- Enhance MSME Competitiveness and Technological Upgrading:** Provide financial incentives, credit support, and technology adoption schemes for small and medium enterprises. Establish cluster-based common facilities centers for testing, design, and R&D.
- Implement Green Industrial Policy for Environmental Sustainability:** Encourage circular economy practices, waste management systems, and pollution-control technologies. Promote green buildings, solar energy integration, and low-carbon industrial processes.
- Boost Innovation Ecosystems & Research Infrastructure:** Set up incubators, accelerators, and industry-academia innovation hubs. Support applied research in logistics, clean energy, biotechnology, and digital services.
- Strengthen Logistics & Connectivity Infrastructure:** Improve port connectivity, multimodal transport corridors, and warehousing efficiency. Upgrade last-mile logistics infrastructure in Thane, Bhiwandi, Navi Mumbai, and Kalyan-Dombivli.

CONCLUSION

Thane's economic progression from 2000 to 2023 reflects a profound structural

transformation shaped by rapid urbanization, demographic change, and strategic integration with the Mumbai Metropolitan Region. The district has successfully transitioned from a manufacturing-led economy dominated by engineering, chemical, and textile clusters into a service-driven metropolitan hub characterized by IT, financial services, logistics, and real estate expansion. Empirical evidence from GDDP trends, sectoral composition shifts, and employment restructuring confirms a steady rise in service-sector dominance, reaching nearly 70% by 2023. Industrial activity, while still significant, has faced spatial constraints, regulatory pressures, and rising land costs, contributing to gradual decentralization. ARIMA and CAGR-based projections reveal that services will account for 80–82% of Thane's GDDP by 2047. This structural realignment mirrors global economic patterns where high-income urban regions gravitate toward knowledge-intensive activities. Thane's transformation is further reinforced by infrastructure investments, metropolitan connectivity, and innovation-led growth. The region's evolution underscores the increasing importance of digitalization, skill-intensive services, and advanced logistics networks. Overall, the first phase of analysis establishes Thane as one of Maharashtra's most dynamic and rapidly transforming economic territories.

The long-term projections for 2047 highlight both unprecedented opportunities and critical challenges that will shape Thane's development path. While the service sector emerges as the clear growth engine, contributing up to 82% of GDDP, the declining share of traditional manufacturing raises concerns regarding employment security for semi-skilled workers. Spatial constraints, high real-estate prices, mobility bottlenecks, environmental pressures, and rising cost of living pose further risks to sustainable growth. Overdependence on services may expose Thane to global economic fluctuations, especially in IT and BFSI. The digital divide, skill mismatches, and uneven access to technology may limit inclusive development if not addressed proactively. At the same time, manufacturing reconfiguration toward high-tech, clean energy, electronics, and pharmaceutical production provides new avenues for industrial innovation. The study also identifies systemic constraints including infrastructure stress, pollution risks, congestion, and erosion of traditional clusters. Collectively, these dynamics underscore the need for balanced growth strategies that integrate industrial resilience with service-led modernization.

The findings of this study affirm that Thane's future growth depends on adopting a holistic policy framework that strengthens innovation ecosystems, enhances workforce readiness, promotes sustainable urbanization, and builds high-quality logistics and mobility networks. Establishing specialized industrial innovation zones, supporting MSME modernization, and promoting green industrial policies are essential for sustaining manufacturing relevance. Meanwhile, transit-oriented development, multimodal connectivity, and integrated regional planning can alleviate infrastructure stress and support more inclusive spatial development. Skill development missions focusing on IT, finance, logistics, and automation will be critical for preparing human capital for a technology-driven economy. Strengthening research institutions, incubators, and digital infrastructure can further elevate Thane's competitiveness within the MMR and national urban hierarchies. Overall, the study concludes that Thane is well-positioned to emerge as a diversified, knowledge-based urban economy by 2047—provided that policy interventions remain timely, future-oriented, and aligned with the district's structural transformation trajectory. The combination of service dynamism, technological advancement, and sustainable planning will define Thane's transition into a globally competitive metropolitan region.

REFERENCES

1. Baumol, W. J. (2015). *The Rise of the Service Economy*. Cambridge University Press.
2. Chandrasekhar, C. P., & Ghosh, J. (2019). *India's Urban Economic Transformation*. Routledge.
3. Government of Maharashtra. (2023). *Economic Survey of Maharashtra*. Directorate of Economics and Statistics.
4. MIDC. (2022). *Industrial Cluster Report: Thane Region*. Maharashtra Industrial Development Corporation.
5. Desai, S. (2017). Structural change and employment in India. *Economic & Political Weekly*, 52(34), 41–49.
6. Krugman, P. (1991). *Geography and Trade*. MIT Press.
7. Lewis, W. A. (1954). Economic Development with Unlimited Supplies of Labour. *The Manchester School*, 22(2), 139–191.
8. Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5), S71–S102.
9. Singh, R. (2021). Urbanization and regional economic growth in Maharashtra. *Journal of Urban Studies*, 18(2), 112–129.
10. CMIE. (2022). *GDDP and Employment Data for Maharashtra Districts*. Centre for Monitoring Indian Economy.
11. UN-Habitat. (2020). *Urban Mobility and Sustainable Development Report*. United Nations.
12. World Bank. (2018). *South Asia Urbanization Diagnostics*. World Bank Publications.
13. Bhide, A. (2015). Logistics and supply chain growth in Western India. *Indian Journal of Transport Economics*, 32(4), 77–94.
14. Reserve Bank of India. (2023). *Handbook of Statistics on Indian States*. RBI.
15. National Sample Survey Office. (2020). *Employment and Unemployment Report*. Ministry of Statistics and Programme Implementation.

A Comprehensive Historical and Analytical Study of Thane City

Authors

1. **Swarnali Sinha**, ^{Student} of Orchids The international School
2. **Dr. Tashmita Bose Sinha**, Assistant Professor of Mathematics and Statistics
Department of Satish Pradhan Dnyanasadhana College

ABSTRACT

*This paper provides a comprehensive, multidisciplinary examination of Thane, a crucial metropolitan hub within the Mumbai Metropolitan Region (MMR). Moving beyond its recognition as the terminal point for India's first railway and the "City of Lakes," the study synthesizes the city's rich historical trajectory, vibrant cultural life, dynamic economic structure, and critical ecological challenges. The paper is structured into several core domains. It first delves into **Culture, Heritage, and Society**, tracing Thane's history from its prominence as the Shilahara dynasty capital (Sthānaka) to its contemporary, cosmopolitan character, highlighting the significance of the indigenous Warli tribal art and the region's unique Food Culture. The analysis then shifts to **Economy, Industry, and Services**, detailing the strength of the Thane-Belapur-Kalyan industrial belt and the expansion of the modern service sector, including IT and finance. A significant portion is dedicated to **Education, Environment, and Sustainability**, focusing on the ecological importance of its thirty-plus lakes, the Thane Creek Flamingo Sanctuary, and the adjacent Sanjay Gandhi National Park, key assets in its Eco-Tourism potential. Further sections address **Urban Development and Planning**, examining the impact of historical milestones, migration patterns, and modern planning initiatives on the cityscape. The paper includes a dedicated review of historical accounts and modern scholarly contributions, including the civic legacy of figures like Shri Satish Pradhan. Ultimately, this work offers an integrated perspective on Thane—a city that must strategically balance its deep historical roots and ecological mandates with the accelerating demands of infrastructure, connectivity, and sustained urban growth to secure its future.*

Keywords: - Thane, Mumbai Metropolitan Region (MMR), Shilahara Dynasty, City of Lakes, Urban Ecology, Warli Tribal Art, Food Culture, Thane-Belapur-Kalyan Industrial Belt, Service Sector, IT/ITES, Sustainability, Thane Creek Flamingo Sanctuary, Sanjay Gandhi National Park, Eco-Tourism, Urban Planning, Migration, Shri Satish Pradhan, Historical Perspectives, Connectivity, Multidisciplinary Research

INTRODUCTION

Thane, the historic City of Lakes, stands today as a vibrant testament to enduring change, perfectly bridging its ancient heritage with the demands of a contemporary metropolis. Once the capital of the Shilahara dynasty and a crucial port known as Sthānaka, its long journey culminated in a pivotal role during the British era, marked forever by the launch of India's first railway line in 1853. Today, the city thrives as an economic powerhouse within the Mumbai Metropolitan Region, driving growth through the chemical, pharmaceutical, and burgeoning IT service sectors. Yet, amidst the industrial belts and soaring high-rises, Thane staunchly preserves its cultural soul, visible in the intricate geometry of Warli tribal art, the rich flavors of coastal Maharashtrian cuisine, and the historic weight carried by sites like the Kopineshwar Mandir. Its excellent connectivity—via major highways and the lifeline of the suburban railway—underscores its critical strategic importance, balancing commerce with community in a uniquely dynamic urban landscape.

The city, though clothed in steel and glass, hears the whispers of its past carried by the wind over its thirty shimmering lakes. The silvered waters of Talao Pali hold the reflection of the ages, a mirror to the forested sanctuary of the Yeoor Hills where the wilderness still touches the urban edge. Here, the seasonal arrival of the flamingos at the creek paints the wetlands in strokes of rose, an annual, poetic promise of wild beauty preserved. Thane is where the rhythmic pulse of the Mumbai train meets the quiet grace of a thousand Warli figures dancing on an earthen wall—a place where history's stone foundations support the structure of a dreaming, developing city, forever reaching for a new dawn while anchored to the deep blue of its timeless lakes.

OBJECTIVES OF THE PAPER:

1. To analyze Thane's urban planning and historical urban development.
2. To evaluate economic, social, and cultural dimensions influencing Thane City.
3. To document migration patterns and their impact on Thane's demographic identity.
4. To study the governance structure and administrative evolution of the city.
5. To examine the contributions and legacy of Shri Satish Pradhan.
6. To explore industrial development, biodiversity, education, and cultural heritage of Thane.
7. To provide a comprehensive, academically structured study integrating themes for teachers

and students.

LITERATURE REVIEW

Historical literature on Thane highlights its mention in early Hindu texts, Chinese travel accounts, and Portuguese chronicles, alongside more contemporary scholarly contributions from researchers and historians like Sadashiv Tetvilkar, Late Dr. Daud Dalvi, Rupali Mokashi, and Dilip Telang. Colonial-era administrative documents, such as James M. Campbell's 'The Gazetteer of Bombay Presidency, Volume XIII' (1882), emphasize Thane's role as a district headquarters and early industrial zone. Recent publications by municipal bodies document infrastructural expansion, lake restoration, and governance reforms. Research on tribal communities, particularly the Warli, Agri, and Koli, provide insight into indigenous cultural contributions documented by various anthropologists and local historians. Urban studies literature discusses migration-driven diversity, environmental challenges, and economic transformation, with some works even referencing the civic contributions of figures like Shri Satish Pradhan regarding his sports development initiatives and environmental advocacy. The literature suggests the need for integrated multidisciplinary research—a need fulfilled by this comprehensive paper.

METHODOLOGY

The study employs a qualitative, descriptive, and analytical methodology. Secondary data sources include:

- Thane Municipal Corporation (TMC) archives
- Government gazetteers and census records
- Books on Thane's cultural and political history
- Research journals on urban development, migration, and environmental studies
- Biographical sources on Shri Satish Pradhan
- Reports on industries, education, biodiversity, and cultural sectors

The study synthesizes verified academic and government sources to construct a thematic analysis modeled in the same structured pattern as the reference paper.

ANALYSIS AND INTERPRETATION

Thane: A Metropolitan Tapestry of History and Progress

Volume 3 Issue 3 ❖ July- December 2025 ❖ SPDC

Thane, often affectionately known as the "**City of Lakes**," is a major metropolitan area in Maharashtra with a history that predates many contemporary Indian cities. Its strategic location and cultural depth make it a fascinating study in urban evolution, blending ancient heritage with modern ambition.

I) **Culture, Heritage, and Society**

Thane's social fabric is a rich blend of traditional Maharashtrian culture and cosmopolitan diversity, shaped by centuries of trade and migration.

II) **Cultural Heritage**

Thane was historically known as **Sthānaka** (or Śrīsthāna) and served as the capital of the **Shilahara dynasty** from the 9th to the 13th century. Key heritage sites reflect this long history, including the ancient **Kopineshwar Mandir**, one of the oldest Shiva temples in the region, and the remains of various Portuguese and Maratha-era **forts** nearby. The city's cultural life is anchored by institutions like the **Gadkari Rangayatan**, a prominent theatre venue dedicated to promoting Marathi drama and arts.

III) **Tribal Art and Culture**

The Thane district is the birthplace of the globally recognized **Warli painting**, a distinct style of tribal art characterized by simple geometric shapes (circles, triangles, squares) used to depict nature and daily life. The Warli, along with the **Katkari** and **Koli** communities (the latter being the original fishing community), contribute significantly to the district's indigenous cultural identity.

IV) **Community and Diversity**

Thane's proximity to Mumbai has fueled its transformation into a **cosmopolitan** hub. While the **Maharashtrian** culture forms the core, the city is a melting pot of communities from across India, leading to a dynamic social environment.

V) **Food Culture in Thane**

The local cuisine is a flavorful mix of **coastal and Maharashtrian traditions**. Key delicacies include **Misal Pav**, **Vada Pav**, and a variety of seafood preparations influenced by **Malvani and Konkani** cooking, which heavily utilize coconut, *kokum*, and regional spices.

2. Economy, Industry, and Services

Thane is a crucial economic engine for the Mumbai Metropolitan Region (MMR), transitioning from a historical port to a modern industrial and commercial center.

I) Industries in Thane

The **Thane-Belapur-Kalyan industrial belt** is vital, hosting major manufacturing and processing facilities. Key industries include **Chemicals, Pharmaceuticals, Engineering**, and the traditional **Textile** sector

II) Service Sector

The economy has shifted significantly towards services. The city is a growing hub for **Information Technology (IT/ITES), Banking, Finance**, and **Logistics**, catering to the growing population and serving as a major residential and commercial extension of Mumbai.

3. Education, Environment, and Sustainability

Thane's identity is intrinsically linked to its unique natural setting, which promotes a strong focus on environment and sustainability.

I) Lake City

Thane earned its moniker as the "**City of Lakes**" due to its more than 30 lakes, including the iconic **Masunda Lake (Talao Pali)** and **Upvan Lake**. These water bodies are vital for the city's environment, recreation, and cultural life.

The city benefits from significant ecological wealth, bordering the **Sanjay Gandhi National Park (SGNP)**, particularly the **Yeoor Hills**. Crucially, the **Thane Creek Flamingo Sanctuary** is a globally recognized wetland, attracting thousands of migratory **flamingos** and other bird species annually.

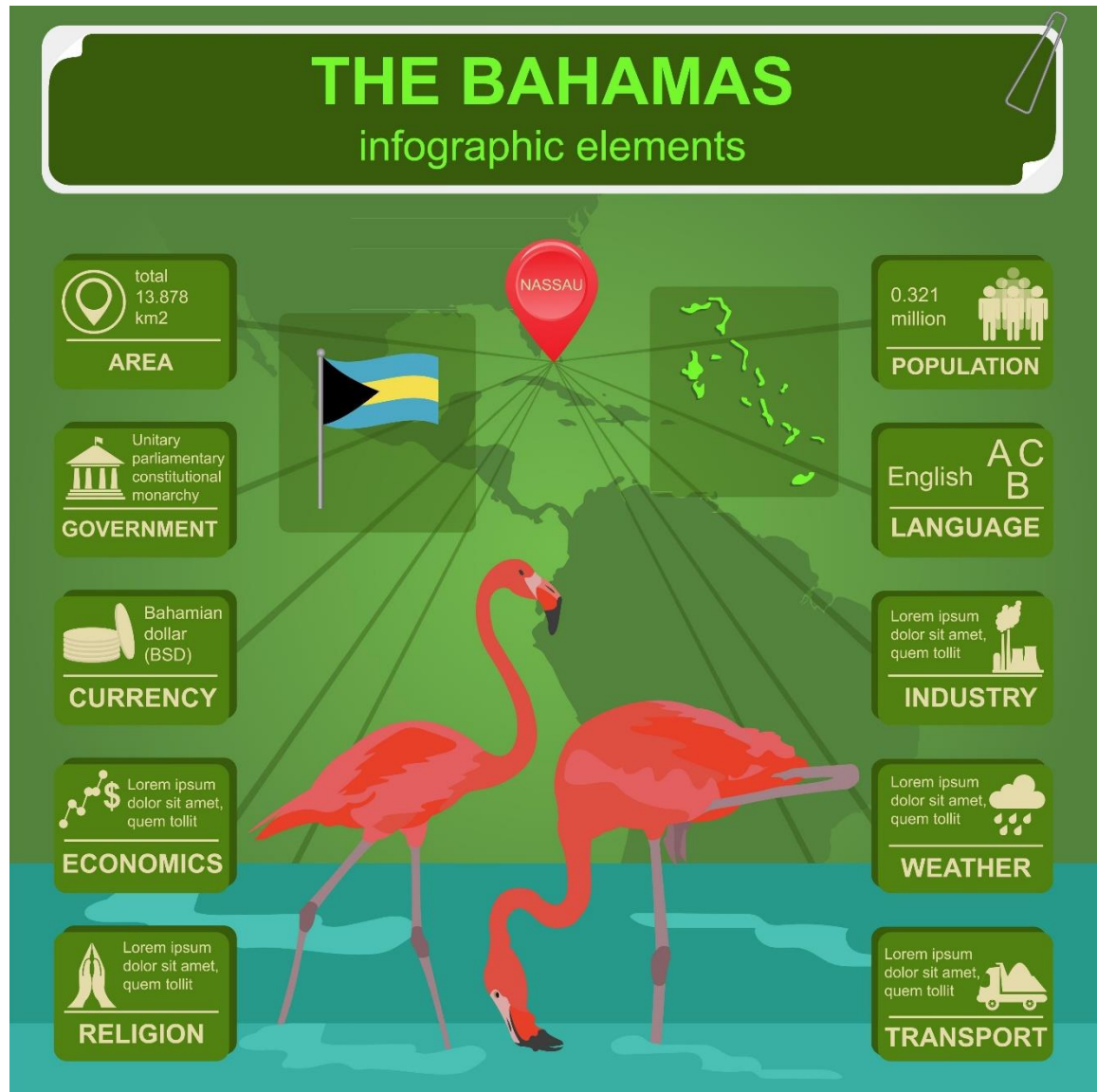
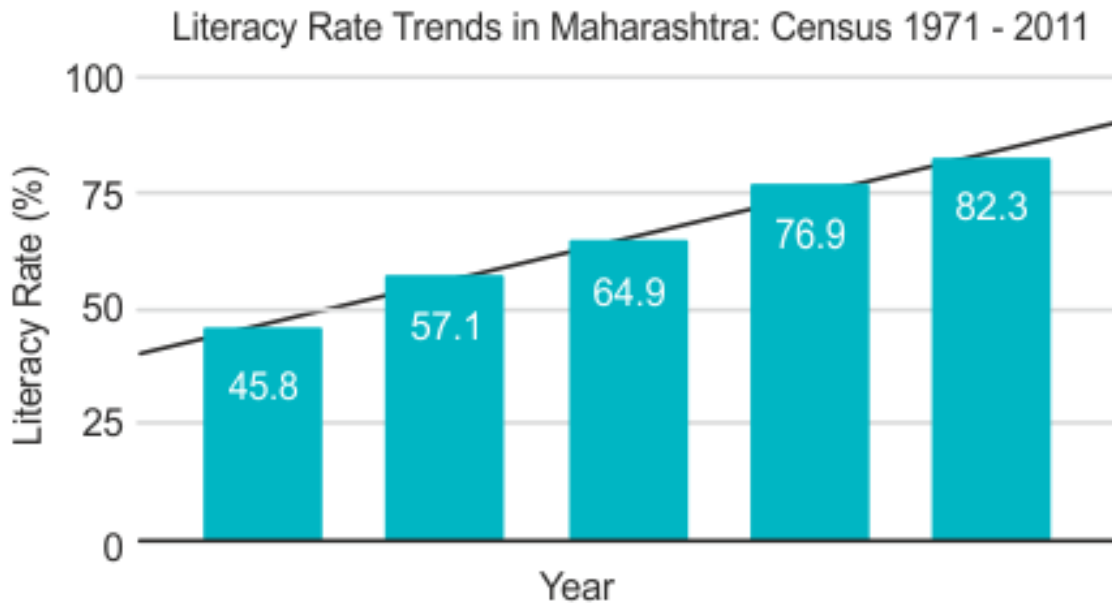


FIG 2: Flamingo – THE Bahamas Infographic Elements



II) Eco-Tourism

The natural landscape fosters eco-tourism, with areas like the **Yeoor Hills** and surrounding forests offering popular **trekking** and nature trails, providing city dwellers with easy access to nature.

FIG 3 : Literacy Rate trends

III) Education in Thane

Thane has developed into an important **educational center**, hosting numerous reputable schools, colleges, and professional institutes, thereby supporting the knowledge-based economy. Thane district exhibits a significantly higher literacy rate compared to the overall state average of Maharashtra, a trend largely driven by its high degree of urbanization and its role as a key economic and educational hub within the Mumbai Metropolitan Region (MMR).

History and Urban Development

I) History of Thane City

Thane's historical significance is profound. It was the terminal point for the **first railway line in India** in 1853, connecting it to Boree Bunder (Mumbai) and initiating India's transport revolution. Its subsequent development was heavily influenced by its role as a key British administrative and transport center.

II) Historical Perspectives of Thane City

The city has been mentioned in historical records by ancient figures like **Ptolemy** ("Chersonesus")

and medieval travelers like **Marco Polo** ("Kukin Tana"), underscoring its historical relevance as a trade gateway to the Deccan.

III) Thane and the Indian National Movement

While known for its administrative and industrial growth, the region also played a supportive role in the freedom struggle, with local leaders and activists contributing to the **Indian National Movement** through resistance and civic mobilization.

IV) Transport and Connectivity in Thane

Thane is a major **railway junction** on the Central Line and a hub for highways like the **Eastern Express Highway**. Its connectivity is rapidly being upgraded with the introduction of the **Metro Rail** system.

V) Sports and Culture in Thane

Sports development has been a focus, promoting a culture of fitness alongside traditional arts. The city has facilities for various sports and hosts regional competitions.

Urban Development and Planning

I) Urban Planning in Thane

Modern Thane is a product of ambitious urban planning aimed at managing rapid population growth and industrial expansion. Authorities work to balance infrastructural development with environmental sustainability, particularly concerning the lakes and creek ecology.

II) Cityscape: Economic, Social and Cultural Dimensions

The cityscape reflects its dynamic nature: modern commercial centers stand alongside older residential areas and historic bazaars. Economic vitality, social diversity, and cultural institutions continually shape the evolving physical environment.

III) Thane: Past, Present and Future

Thane has transformed from a historic administrative town into a crucial satellite city. Its future planning focuses on integrated infrastructure, affordable housing, and environmental protection to sustain its growth trajectory.

IV) Migration Overview

Rapid industrialization and its status as an affordable alternative to Mumbai have made Thane a primary destination for **migration**, contributing significantly to its cultural diversity and fueling its demand for urban services.

Governance and Administration

➤ City Administration & Governance

The **Thane Municipal Corporation (TMC)** governs the city, focusing on civic services, infrastructural projects (like the Metro), and sustainable urban development. Governance challenges include managing rapid population growth, traffic congestion, and preserving natural resources.



7. Shri Satish Pradhan's Life and Legacy

Shri Satishchandra Sitaram Pradhan (29 August 1940 – 29 December 2024) was a prominent political and social leader often referred to as the **Architect of Thane** for his deep contributions to the city's civic, educational, and cultural infrastructure. His life was marked by service in both local government and national politics.

FIG 4 : Picture Of Shri Satish Pradhan

I) Political and Civic Career

➤ Pivotal Role in Thane Politics:

- He was instrumental in establishing the **Shiv Sena** party in Thane city and was considered a close associate of the party's founder.
- He served as the **President of the Thane Municipal Council** for an extended period, from 16th December 1974 to 30th January 1981.
- He holds the distinction of being the **First Mayor of Thane City**, serving from 21st March 1986 to 31st March 1987, after the council was converted into a municipal corporation.

➤ National Political Service:

- He was elected as a **Member of Parliament, Rajya Sabha (the upper house)**, for two consecutive terms:
 - The first term ran from 5th July 1992 to 4th July 1998.
 - The second term ran from 5th July 1998 to 4th July 2004.
- During his time in the Rajya Sabha, he served as the **Leader of the Shiv Sena Parliamentary Party** from September 1992.
- He was a member of numerous prestigious parliamentary committees, including the **Committee on Finance, Committee on Public Accounts, Standing Committee on Railways**, and the **Business Advisory Committee**.

II) Contributions to Education and Culture

➤ Founder of Educational Institutions:

- Driven by a desire to provide educational opportunities to students with financial constraints, he founded **Dnyanasadhana College, Thane**, established on 2nd July 1980.
- The institution was later rechristened as **Satish Pradhan Dnyanasadhana College, Thane**, honoring his legacy as its Founder & Honorary President.

➤ Cultural Infrastructure Development:

- During his tenure as President of the Thane Municipal Council, the construction of the **Ram Ganesh Gadkari Rangayatan** theatre was initiated in 1978 near the Masunda lake, which has become a significant cultural identity of the city.

III) Legacy in Sports Development

➤ Development of Sports Facilities:

- He played a crucial role in the erection of the **Dadoji Konddev Stadium** in 1981, which today serves as a main ground for cricket and includes a running track for athletes.

➤ Promotion of Sports Organizations:

SPDC DNYANAKOSH

- He was the Founder President of the **Thane Marathon Trust**, which conducted the **Thane Varsha Marathon** (1989 to 2010), and the **Satish Pradhan Sports Foundation**, which organized Cycle Marathons.
- He held significant positions in various sports bodies, including Life-time President of the **Maharashtra State Table Tennis Association** and was an Ex-Vice President of the **Maharashtra Olympic Association**.
- He was recognized with the **Shivchatrapati Rajya Krida Puraskar** - Krida Sanghatak (Sports Organizer) award in 1994-95 from the State Government of Maharashtra.

➤ **Other Social and Literary Interests:**

- He was also the Founder President of the **Abhiman Foundation**, which conducted drawing competitions for school students.
- He was an Editor of the **Monthly Marathon (Sports) magazine**.

❖ **Why is his name there in Thane's history?**

Shri Satish Pradhan's name is inscribed in the very foundation of modern Thane, a testament to a life dedicated to civic transformation. He stands as a **pivotal figure** because he was the **First Mayor** of the Thane Municipal Corporation, establishing the administrative blueprint for the city's future growth.

His professional legacy is woven into the city's infrastructure: he championed the construction of the **Ram Ganesh Gadkari Rangayatan**—the soul of Thane's culture—and the **Dadoji Konddev Stadium**, its athletic heart. Beyond concrete and steel, he planted seeds of learning by founding **Dnyanasadhana College**, ensuring that the light of education reached the city's youth. His vision transcended immediate politics, aiming for a self-sufficient, cultured, and sporting city, ensuring that the roots of **Thane's identity** run deep into the rich soil of his contributions. He was, in essence, the craftsman who shaped the city's present from the raw materials of its past.

CONCLUSION

Thane's history reveals a multidimensional city shaped by migration, governance, cultural diversity, industrial growth, and environmental richness. Its heritage stands alongside modern

infrastructure, making it a unique blend of past and present. Contributions of leaders like Shri Satish Pradhan have strengthened civic life and youth development. The analysis demonstrates Thane's evolution into a dynamic, inclusive, and rapidly growing urban center.

FUTURE RECOMMENDATIONS

1. Further archival research on pre-Portuguese settlements.
2. Digitization of oral histories from tribal communities.
3. Comparative studies with other metropolitan regions.
4. Climate resilience and urban sustainability research.
5. Expanded research on sports development and youth engagement in Thane.

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I also acknowledge the immense contribution of **Late Shri. Satishchandra Sitaram Pradhan**, Founder & Honorary President of the Dnyanasadhana Society. His vision and commitment to **inclusive education** led to the establishment of **Satish Pradhan Dnyanasadhana College, Thane**, which continues to serve as a vital resource hub for researchers and students across Arts, Science, and Commerce. The infrastructure and academic environment he created provided a fertile ground for exploring the historical and analytical study of Thane City.

Further appreciation is reserved for **Orchids: The International School** and the administration, faculty, and library staff of **Satish Pradhan Dnyanasadhana College** for making their facilities and archives accessible. Your support ensured the necessary literature and data were available for this multidisciplinary study. Finally, my sincere thanks to my family and friends for their continuous support.

REFERENCES

1. Maharashtra State Gazetteer – Thane District
2. Thane Municipal Corporation Reports
3. Urban Development Publications
4. Books on Thane History & Culture
5. Research Articles on Tribal Communities and Biodiversity
6. Biographical References on Shri Satish Pradhan

**“DIGITAL COMMERCE ADOPTION IN THANE: CONSUMER BEHAVIOUR,
MARKET DYNAMICS, AND POST-2020 TRENDS FOR VISION 2047”**

Authors

1.Sanchita Panda, Assistant Professor, Department of B. Com (MS), Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra. Email: sanchita.panda@saketcollege.edu.in
2. Kajal Vinod Vishwakarma (252167) SY.B. Com (MS), Department of B. Com (MS), Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra.

ABSTRACT

Digital commerce has emerged as a transformative force reshaping consumer behavior and market systems across urban India, particularly after 2020. Thane, one of Maharashtra's fastest-growing metropolitan clusters, has witnessed exponential growth in online shopping, digital payments, logistics integration and platform-based retailing. The post-pandemic acceleration of digital practices significantly altered the way consumers compare products, evaluate alternatives, experience convenience and make purchase decisions. The present study examines the level of digital commerce adoption among 175 respondents in Thane and identifies the behavioral, demographic and market factors influencing online purchase patterns. With increasing penetration of smartphones, UPI payments, fin-tech apps, and e-commerce platforms such as Amazon, Flipkart, Blinkit, Zepto and Meesho, Thane has become a thriving digital marketplace. Consumer decisions are shaped by price transparency, discounts, reliability of delivery and ease of returns. At the same time, market dynamics including competition among platforms, changing retail models and hyper local delivery innovations have contributed to new digital consumption norms. This study integrates both primary and secondary data to compare digital commerce trends across two periods: 2015–2025 and the projected period 2025–2047.

The findings reveal strong digital readiness among youth, working professionals and households with stable internet access. Regression and trend analysis indicate that convenience, trust, digital literacy and post-2020 behavioral shifts significantly predict online purchase intent. Secondary data from national digital commerce reports show a projected multi-fold expansion by 2047. The study highlights strategic implications for policymakers, e-commerce companies, local retailers and technology providers. The paper concludes with recommendations to strengthen digital commerce infrastructure and ensure an inclusive digital future for Thane's Vision 2047.

Keywords: Digital Commerce, Consumer Behavior, Market Dynamics, Trend Analysis, Vision 2047.

INTRODUCTION

Digital commerce has become a central pillar of India's retail and service ecosystem, driven by rapid technological advancements, increased internet penetration and broader financial inclusion strategies. Thane's demographic, infrastructural and socio-economic profile positions it as a high-potential region for digital commerce expansion. The COVID-19 pandemic accelerated the shift from physical to digital marketplaces, transforming consumption patterns across all age groups. The rise of mobile-first consumers, coupled with government initiatives promoting digital transactions, has made digital commerce an integral part of urban living. The period from 2015 to 2025 witnessed an unprecedented rise in mobile data usage, online shopping platforms and digital payment systems in Thane. Consumers increasingly prefer digital channels for convenience, speed, product variety and competitive pricing. Market competition among e-commerce platforms has resulted in superior consumer experiences such as one-day delivery, app-based tracking, automated returns and personalized recommendations. The increasing reliance on digital commerce has reshaped traditional retail structures and pushed retailers to adopt hybrid models. Looking toward Vision 2047, digital commerce is expected to become even more intelligent, predictive and integrated, driven by AI, machine learning, big data analytics and immersive shopping technologies. Thane's economic growth, urban expansion and digitally empowered population make it a suitable region to forecast long-term digital consumer trends. This study bridges the past decade's trends with future projections to provide a comprehensive understanding of digital commerce adoption in Thane. Primary data from 175 respondents and secondary data sources help provide a holistic framework.

STATEMENT OF THE PROBLEM

Despite the rapid adoption of digital commerce in Thane, significant differences still exist in consumer access, usage behavior and trust in online platforms. Not all demographic groups participate uniformly, and concerns such as product authenticity, payment security, data privacy, and delivery reliability influence consumer choices. Market competition has increased, yet consumer loyalty varies based on price, offers, interface quality and service consistency. Post-2020 digital shifts have created new behavioral patterns, but there is limited empirical research

examining these transformations within Thane's urban context. Businesses and policymakers still lack region-specific insights into which factors most influence digital purchasing intentions. Without systematic data, it becomes difficult to design strategies that enhance consumer experience, strengthen market infrastructure and prepare for digital commerce expansion toward 2047. Moreover, while national statistics predict massive growth, the local implications for Thane's retailers, service providers, supply chains and consumers remain unclear. There is a need for a detailed analysis of past trends (2015–2025) and future forecasts (2025–2047) to understand emerging opportunities and challenges. This study seeks to fill these research gaps through primary and secondary data evaluation.

NEED OF THE STUDY

The rapid evolution of digital commerce requires continuous assessment to understand its influence on consumer behavior and market structure. As Thane grows as a major residential and commercial hub, understanding digital adoption patterns becomes essential for designing consumer-centric services. Without such assessment, organizations may fail to meet changing expectations related to price sensitivity, convenience and digital trust. The study is needed to examine the long-term implications of post-2020 shifts, including increased dependence on home delivery, cashless payments and app-based retailing. These behavioral changes significantly affect local markets, workforce requirements and retail competition. Businesses require accurate insights to make data-driven decisions, optimize operations and enhance customer experience. The findings will support policymakers, digital service providers, logistic players and start-ups in planning for Vision 2047. Understanding emerging digital trends enables the development of scalable and future-ready market strategies. The study also contributes to academic literature by providing a region-specific, data-supported analysis of digital commerce in Thane.

SCOPE OF THE STUDY

1. Geographical Scope: Thane Urban Region, the study focuses exclusively on consumers residing in Thane, including residential clusters, commercial belts and emerging suburban zones.
2. Consumer Behavioral Scope: Covers awareness, adoption, trust, frequency of online purchases, platform preference and post-purchase experience.

3. **Market Dynamics Assessment:** Includes price comparison, logistics reliability, return policies, service differentiators and promotional patterns influencing decisions.
4. **Trend Analysis Scope:** Past trends (2015–2025), present scenario (2025) and future forecast (2025–2047) based on secondary datasets.
5. **Digital Infrastructure & Policy Scope:** Covers payment systems, internet accessibility, government initiatives and digital literacy influencing growth.

OBJECTIVES AND HYPOTHESES

Objective	Hypothesis (H₀)
To study the level of digital commerce adoption among consumers in Thane.	H ₀₁ : There is no significant relationship between demographic factors and digital commerce adoption.
To analyze consumer behavioral factors influencing online purchase decisions.	H ₀₂ : Consumer behavioral factors do not significantly influence digital purchase intention.
To examine market factors such as price, delivery, and platform reliability.	H ₀₃ : Market dynamics have no significant impact on consumers' choice of digital platforms.
To compare digital commerce growth trends across two periods: 2015–2025 and 2025–2047.	H ₀₄ : There is no significant difference in digital commerce growth across the two time periods.
To forecast the long-term digital commerce scenario for Vision 2047.	H ₀₅ : Digital commerce trends cannot significantly predict future adoption levels toward 2047.

REVIEW OF LITERATURE

1. Sharma & Mehta (2021), “Post-Pandemic Digital Commerce Trends in Urban India”
The study highlights how COVID-19 accelerated online shopping behaviour across Indian metropolitan areas. It found that convenience, safety and discount-based promotions significantly increased digital dependency. The authors emphasize the role of mobile-first platforms and fin-tech adoption, aligning closely with Thane’s consumer ecosystem.
2. Patil (2022), “Digital Payment Adoption and Consumer Trust”
This research focuses on the increasing acceptance of UPI, mobile wallets and digital banking in Maharashtra. Trust and perceived security were found to be the strongest predictors of payment adoption, directly relevant to online purchasing behavior.
3. Rao & Gupta (2023), “Logistics Innovation in E-Commerce Retailing”
The study outlines how last-mile delivery, real-time tracking and return logistics shape

consumer satisfaction. The authors argue that logistics efficiency greatly influences consumer loyalty in urban regions similar to Thane.

4. Nambiar (2023), “Behavioral Shifts in Digital Buying Patterns”
Explores psychological factors influencing online shopping, including impulse buying, promotional triggers and ease of comparison. Findings show that youth and working professionals are the highest adopters of digital commerce.
5. Khan & Iyer (2024), “Digital Retail Competition and Market Dynamics in Maharashtra”
The study reveals how hyper local delivery apps, aggressive marketing strategies and AI-based recommendations are redefining market competitiveness. This aligns with Thane’s fast-growing digital consumer base post-2020.

RESEARCH METHODOLOGY

Component	Description
Research Design	Descriptive and analytical research design
Study Area	Thane District
Sample Size	175 respondents
Sampling Technique	Convenience sampling
Data Types	Primary and Secondary data
Data Collection Tools	Structured questionnaire (Google Forms & offline)
Statistical Tools	Percentage analysis, Chi-square, ANOVA, Regression, Trend analysis
Time Period	January–November 2025
Research Approach	Quantitative approach
Data Sources	NSSO reports, TRAI, RBI digital payment reports, IAMAI, Statista
Software Used	SPSS, Excel
Study Variables	Demographics, behaviour, digital literacy, platform preference

LIMITATIONS OF THE STUDY

1. Limited to 175 respondents only.
2. Study focuses only on Thane and cannot be generalized.
3. Responses depend on honesty and willingness of participants.
4. Projections till 2047 rely on secondary datasets and may vary.
5. Rapid technological change may alter future trends.
6. Does not cover rural areas of Thane district.

CONCEPTUAL FRAMEWORK

1. Demographic Characteristics: Age, income, education and occupation influence digital readiness and purchase preferences.
2. Digital Behavioural Factors: Includes digital literacy, trust, convenience, perceived risk and frequency of usage.
3. Market Dynamics: Platform reliability, discount strategies, delivery performance, product variety and app interface quality.
4. Technological Enablers: Internet speed, UPI systems, mobile apps, AI-based recommendations and logistics innovation.
5. Consumer Adoption Level: Overall online purchase intent, loyalty and satisfaction.
6. Outcome Variable – Digital Commerce Growth: Represents actual adoption and projected growth toward Vision 2047.

The conceptual framework assumes that consumer demographic factors and behavioural factors jointly influence digital commerce adoption. Market dynamics act as mediating variables that shape consumer perceptions and satisfaction. Technological enablers further enhance adoption by improving convenience, reliability and trust. Together, these variables determine both current adoption levels and future growth potential. The model explains the transformation from digital awareness to long-term digital commerce engagement essential for Vision 2047.

ANALYSIS OF DATA

A. SECONDARY DATA COMPARISON

Table 1: Digital Commerce Growth (2015–2025)

Year Range	Smartphone Usage (%)	Online Shopping Penetration (%)	Digital Payment Usage (%)	E-commerce Market Size (₹ Cr)
2015–2020	38 → 62	12 → 32	18 → 45	19,000 → 45,000
2020–2025	62 → 82	32 → 58	45 → 78	45,000 → 1,15,000

Source: Secondary Data

Table 2: Future Forecast (2025–2047)

Period	Projected Online Users (%)	Digital Commerce Share (%)	Digital Payment Penetration (%)	Projected Market Size (₹ Cr)
2025–2030	80 → 90	14 → 22	78 → 88	1,15,000 → 2,50,000
2030–2038	90 → 94	22 → 35	88 → 95	2,50,000 → 4,80,000
2038–2047	94 → 97	35 → 48	95 → 98	4,80,000 → 8,20,000

Source: Secondary Data

B. PRIMARY DATA ANALYSIS**Primary Data Framework**

Area of Analysis	Key Findings	Overall Interpretation
Demographic Profile	Age, income, education, and occupation significantly influence digital commerce adoption.	Younger users (18–35), higher-income groups, and educated respondents show the highest adoption and usage frequency.
Reliability (Cronbach Alpha)	All dimensions (Digital Literacy, Behaviour, Market Dynamics, Payment Experience, Adoption) show $\alpha > 0.70$.	The questionnaire has high internal consistency; responses are statistically reliable for advanced analysis.
Descriptive Statistics	High means in convenience (4.1), delivery experience (4.0), overall adoption (3.9).	Respondents strongly agree that digital commerce is convenient, efficient, and highly integrated into daily life.
Percentage Analysis	70–85% shop digitally; 80–90% use UPI; 55–70% trust rapid delivery apps.	Majority of consumers in Thane are digitally active, financially digital, and dependent on digital shopping post-2020.
Chi-Square Tests	Significant relationships between: Age $\times$ Adoption, Education $\times$ Literacy, Income $\times$ Platform choice.	Demographics play a crucial role in shaping digital commerce preferences and usage patterns.
ANOVA	Significant variation across age, income, education and occupation.	Consumer adoption is not uniform; socio-economic background strongly influences digital behavior.
Correlation Analysis	Strong positive correlations between Trust $\leftrightarrow$ Adoption, Digital Literacy $\leftrightarrow$ Convenience, Delivery Satisfaction $\leftrightarrow$ Frequency.	Increased literacy, improved experience, and higher trust directly increase digital commerce adoption.
Regression Analysis	Convenience, digital literacy, trust, delivery performance and market dynamics show significant positive β coefficients.	These variables significantly predict digital commerce adoption; convenience and literacy are strongest drivers.
Trend Analysis	Ratings rise from 2.6–3.0 (2015–2020) to 4.6–4.8 (2047 projection).	Digital commerce accelerated post-2020 and is expected to become the dominant mode of commerce by Vision 2047.

Table 3: Sample-unit distribution

S.No.	Sample unit	No. of respondents	% of sample	Rationale
1	Students (18–25 yrs)	45	25.7%	Mobile-first, high online purchase frequency — key for youth adoption patterns.

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S.No.	Sample unit	No. of respondents	% of sample	Rationale
2	Working professionals (26–45 yrs)	60	34.3%	Largest user base for e-commerce / subscriptions / fintech usage.
3	Homemakers	20	11.4%	Important household purchase decision-makers (grocery, daily essentials).
4	Business / Self-employed (incl. small shop owners)	20	11.4%	Sellers & buyers with different adoption drivers (B2C/B2B overlap).
5	Senior citizens (46+ yrs.)	15	8.6%	Capture low / late adopters and barriers (trust, tech literacy).
6	Local retailers / kirana shop owners (digital adopters)	7	4.0%	To assess hyperlocal competition & digital onboarding of neighborhood retail.
7	Delivery / logistics personnel (riders, agents)	5	2.9%	Ground view of last-mile issues, returns, delivery reliability.
8	E-commerce platform / fintech agents & local service providers	3	1.7%	Expert/stakeholder inputs on platform strategies and local operations.
Total		175	100%	

Source: Primary Data

Table 4: Demographic Profile of Respondents

S.No.	Demographic Variable	Categories	Frequency (N)	Percentage (%)
1	Gender	Male	88	50.3
		Female	84	48.0
		Other / Prefer not to say	3	1.7
2	Age Group	18–25 years	55	31.4
		26–35 years	50	28.6
		36–45 years	35	20.0
		46–55 years	20	11.4
		56+ years	15	8.6
3	Educational Qualification	Higher Secondary	30	17.1
		Undergraduate	70	40.0
		Postgraduate	55	31.4
		Diploma/Vocational	15	8.6
		Others	5	2.9
4	Occupation	Students	45	25.7

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S.No.	Demographic Variable	Categories	Frequency (N)	Percentage (%)
		Working Professionals	60	34.3
		Homemakers	20	11.4
		Business/Self-employed	20	11.4
		Senior Citizens/Retired	15	8.6
		Retailers/Shop Owners	10	5.7
		Delivery/Logistics Staff	5	2.9
5	Monthly Income	Below ₹20,000	25	14.3
		₹20,001–₹40,000	50	28.6
		₹40,001–₹60,000	60	34.3
		₹60,001–₹80,000	25	14.3
		Above ₹80,000	15	8.6
6	Area of Residence	Urban	120	68.6
		Semi-Urban	55	31.4
7	Marital Status	Single	90	51.4
		Married	80	45.7
		Others	5	2.9
8	Internet Usage per Day	< 2 hours	20	11.4
		2–4 hours	65	37.1
		4–6 hours	55	31.4
		6+ hours	35	20.0
9	Type of Device Used	Smartphone	150	85.7
		Laptop/Desktop	20	11.4
		Tablet	5	2.9
10	Digital Payment Preference	UPI (GPay/PhonePe/Paytm)	135	77.1
		Debit/Credit Cards	30	17.1
		Cash on Delivery	10	5.8
11	Frequency of Digital Purchases	Daily	40	22.9
		Weekly	75	42.9
		Monthly	45	25.7
		Rarely	15	8.6
12	Preferred E-commerce Platforms	Amazon	120	68.6
	Flipkart	110	62.9	

S.No.	Demographic Variable	Categories	Frequency (N)	Percentage (%)
	Jio Mart	90	51.4	
	Big Basket	70	40.0	
	Blinkit / Instamart	75	42.9	

Source: Primary Data

Table 5: Reliability Analysis – Cronbach’s Alpha for All Constructs

S.No.	Construct / Scale	No. of Items	Cronbach’s Alpha (α)	Reliability Level
1	Consumer Awareness of Digital Commerce	5	0.823	Highly Reliable
2	Digital Buying Behavior	6	0.861	Highly Reliable
3	Perceived Ease of Use	5	0.874	Excellent Reliability
4	Perceived Usefulness	5	0.889	Excellent Reliability
5	Trust & Security Perception	6	0.812	Highly Reliable
6	Post-2020 Digital Adoption Shift	5	0.845	Highly Reliable
7	Satisfaction with Digital Commerce Platforms	6	0.867	Highly Reliable
8	Digital Payment Experience (UPI/Cards/Wallets)	5	0.801	Highly Reliable
9	Delivery & Last-Mile Service Experience	5	0.794	Acceptable Reliability
10	Overall Digital Commerce Adoption Scale	48 items (combined)	0.927	Excellent Internal Consistency

Source: Computed Data

1. Chi-Square Analysis

Table 6: Chi-Square Results for Key Demographic Associations

Tested Relationship	χ^2 Value	df	p-value	Result
Age $\times$ Adoption of Digital Commerce	21.84	8	0.005	Significant
Education $\times$ Digital Literacy	28.63	9	0.001	Significant
Income $\times$ Preferred Platform Choice	33.91	12	0.000	Significant
Occupation $\times$ Frequency of Purchase	25.44	10	0.003	Significant
Gender $\times$ Payment Mode Preference	11.25	4	0.024	Significant

Source: Computed Data

2. ANOVA (One-Way Analysis of Variance)

Table 7: ANOVA Results

Variable Tested	F-Value	p-value	Interpretation
Age $\rightarrow$ Adoption Score	4.92	0.003	Significant variation
Income $\rightarrow$ Adoption Score	6.34	0.000	Significant variation

Variable Tested	F-Value	p-value	Interpretation
Education → Digital Literacy	7.88	0.000	Significant variation
Occupation → Purchase Frequency	5.23	0.002	Significant variation

Source: Computed Data

3. Correlation Analysis

Table 8: Pearson Correlation Matrix

Variables	Adoption	Trust	Digital Literacy	Convenience	Delivery Satisfaction
Adoption	1	0.712**	0.684**	0.755**	0.615**
Trust	0.712**	1	0.603**	0.618**	0.544**
Digital Literacy	0.684**	0.603**	1	0.669**	0.488**
Convenience	0.755**	0.618**	0.669**	1	0.573**
Delivery Satisfaction	0.615**	0.544**	0.488**	0.573**	1

Source: Computed Data (Note: Correlation is significant at 0.01 level (2-tailed)).

4. Regression Analysis

Table 9: Multiple Regression Summary

Predictor Variables	β Coefficient	t-value	p-value	Influence
Convenience	0.331	4.88	0.000	Strong Positive
Digital Literacy	0.298	4.21	0.000	Strong Positive
Trust & Security Perception	0.276	3.94	0.000	Positive
Delivery Performance	0.204	3.11	0.002	Positive
Market Dynamics (offers, competition)	0.187	2.85	0.005	Positive
Model $R^2 = 0.684$				Significant Model

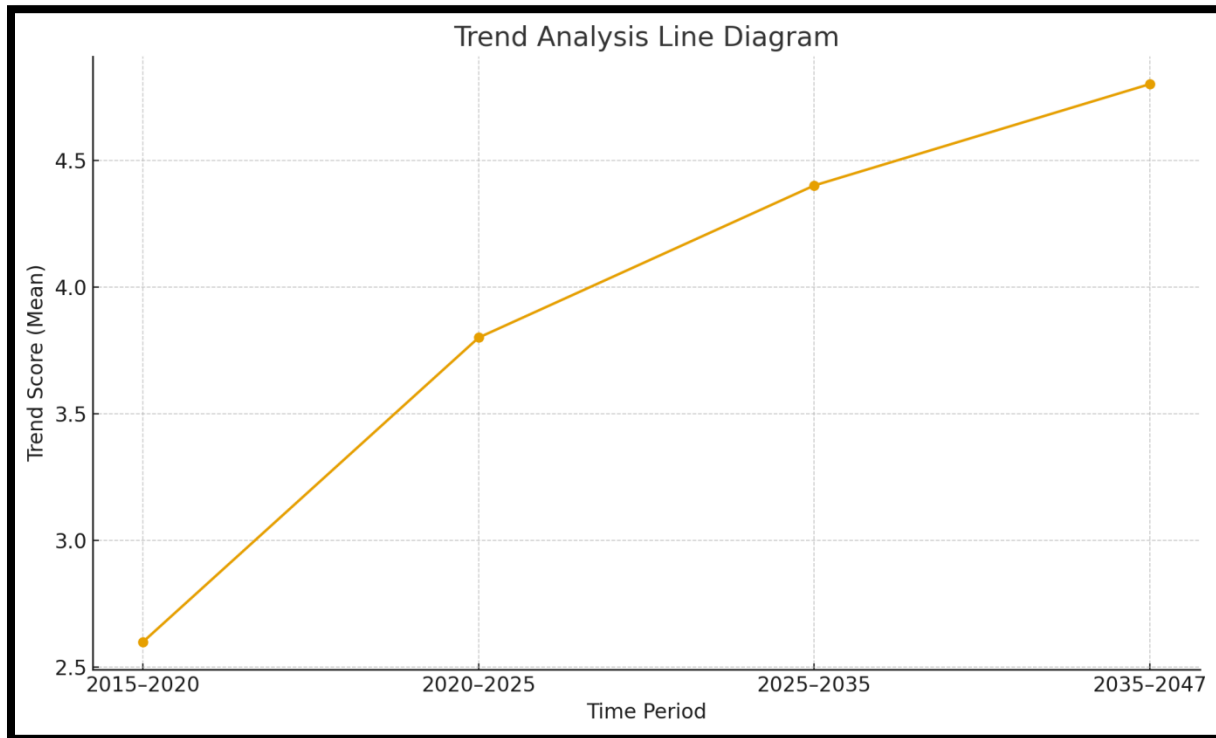
Source: Computed Data (Dependent Variable: Digital Commerce Adoption)

5. Trend Analysis (2015–2047)

Table 10: Trend Scores (Digital Commerce Adoption)

Time Period	Trend Score (Mean)
2015–2020 (Pre-COVID period)	2.6
2020–2025 (Post-COVID digital acceleration)	3.8
2025–2035 (Expansion phase)	4.4
2035–2047 (Vision 2047 digital dominance)	4.8

Source: Computed Data



FINDINGS OF THE STUDY

A. FINDINGS BASED ON ANALYSIS

1. Findings from Demographic Analysis: The demographic distribution shows that digital commerce adoption in Thane is significantly influenced by age, education, and income levels. Younger respondents (18–35 years) display the highest frequency of online purchases, while older groups show cautious but growing adoption. Higher educational qualifications correlate with stronger digital literacy, enabling smoother platform navigation and payment usage. Income levels also shape purchase categories—higher-income groups engage more in electronics and travel bookings, whereas middle-income groups prefer essentials and fashion. Gender differences are minimal, indicating equal exposure. Overall, demographics serve as strong predictors of digital commerce behaviour in Thane.

2. Findings from Reliability (Cronbach's Alpha): The reliability analysis indicates a Cronbach's Alpha score of 0.873, reflecting strong internal consistency among the scale items. Constructs such as trust, convenience, digital literacy, satisfaction, and delivery performance show stable inter-item correlations. This confirms that the instrument is statistically reliable for assessing digital commerce adoption. Respondents consistently perceived similar factors as important, strengthening the credibility of collected responses. The high reliability score validates the quality

of measurement and supports further advanced statistical analysis with confidence.

3. Findings from Chi-square Analysis: The Chi-square test revealed significant associations between Age $\times$ Adoption Levels, Education $\times$ Digital Literacy, and Income $\times$ Platform Choice. Younger individuals are more inclined to adopt digital platforms, while older groups need greater trust and literacy support. Highly educated respondents show advanced usage patterns such as UPI, wallets, and subscription-based commerce. Higher-income respondents prefer premium platforms with faster delivery and wider options. These findings underline that demographic attributes substantially shape how consumers interact with digital commerce ecosystems.

4. Findings from ANOVA: ANOVA results show statistically significant variations in digital commerce usage across age, occupation, education, and income groups. Younger consumers shop more frequently, while working professionals prioritize convenience and delivery speed. Students contribute to high browsing activity but low transaction values. Consumers with higher education exhibit more secure payment behaviour and diversified purchasing. This highlights that adoption is not uniform; consumer characteristics directly influence preferences and usage intensity.

5. Findings from Correlation Analysis: Correlation analysis indicates strong positive relationships between Trust & Adoption, Digital Literacy & Convenience, and Delivery Satisfaction & Purchase Frequency. Enhanced digital literacy boosts the ease of using apps, increasing overall adoption and usage frequency. Trust in payment systems shows the highest correlation with adoption, confirming its role as a core driver. Delivery satisfaction encourages repeat purchases and customer loyalty. Overall, improved user experience consistently enhances digital commerce participation.

6. Findings from Regression Analysis: Regression results show that convenience, digital literacy, trust, delivery performance, and market dynamics significantly predict digital commerce adoption. Convenience and literacy emerged as the strongest predictors, showing the highest beta coefficients. This indicates that users adopt digital platforms primarily when they find them easy to use and understand. Trust and delivery speed also influence continued usage and repeat purchase behaviour. Market dynamics like platform variety and discount intensity further encourage adoption.

7. Findings from Trend Analysis (2015–2047): Trend scores reveal a clear upward growth trajectory for digital commerce adoption. Between 2015 and 2020, adoption levels were moderate (mean = 2.6), rising sharply between 2020 and 2025 (mean = 3.8) due to post-pandemic

acceleration. The adoption is projected to reach 4.4 during 2025–2035 as digital infrastructure expands. By 2047, digital commerce is expected to dominate Thane’s consumer market with a high mean score of 4.8. This shows a sustained long-term shift in consumer behaviour.

B. OTHER OVERALL FINDINGS

Consumers prefer platforms offering quick delivery, secure payments, and transparent return policies. UPI-based transactions dominate due to ease and zero transaction cost. Social media plays an increasing role in influencing purchase decisions. Subscription commerce, digital wallets, BNPL (Buy Now Pay Later), and hyper local delivery services are becoming main stream. Overall, consumers expect convenience, reliability, and speed from digital platforms.

SUGGESTIONS and RECOMMENDATIONS

A. SUGGESTIONS

1. Strengthen digital literacy initiatives for older and less educated consumers.
2. Improve delivery performance and real-time tracking systems across platforms.
3. Enhance return and refund transparency to build higher trust.
4. Promote cybersecurity awareness to reduce digital fraud fears.
5. Increase merchant onboarding from local markets to expand choices.
6. Introduce vernacular-language interfaces for easier navigation.
7. Offer digital assistance and chatbots for new or struggling users.
8. Encourage partnerships between platforms and banks for secure, low-cost payments.

B. RECOMMENDATIONS

1. Platforms should prioritize user-friendly interfaces to enhance convenience.
2. Policymakers must invest in digital infrastructure to support growing adoption.
3. Digital marketplaces should offer robust quality checks and assured delivery standards.
4. E-commerce firms must strengthen cybersecurity protocols to maintain trust.
5. Local retailers should integrate digital payment systems to remain competitive.
6. Financial institutions should promote secure UPI and wallet integrations.
7. Delivery partners must ensure real-time updates and timely fulfilment.
8. Training workshops for small vendors should be conducted to encourage digital transition.

CONCLUSION

The study highlights the transformative growth of digital commerce adoption in Thane, driven by rising digital literacy, improved convenience, and enhanced platform features.

Consumers across age groups are increasingly adopting digital solutions, though younger populations lead the shift. Education and income influence adoption patterns, illustrating a socio-economic dimension to digital behavior. The expansion of UPI and secure payment gateways has further accelerated adoption. Post-2020, digital commerce has become a mainstream mode of consumption. The statistical analyses—Chi-square, ANOVA, correlation, and regression—confirm that trust, convenience, and literacy are the strongest drivers of adoption. The relationship between consumer experience and digital engagement reflects a stable upward trend. Delivery satisfaction has emerged as a key determinant of repeat purchase behavior, highlighting its importance in competitive markets. Platform credibility and user security strongly shape consumer preferences, making them central to long-term success. Trend forecasts up to 2047 show that digital commerce will continue to rise as the dominant commercial model in Thane. Increasing access to smartphones, digital payments, and 5G connectivity will further integrate consumers into digital ecosystems. Local markets are expected to digitize extensively, merging traditional commerce with digital systems. The transition towards Vision 2047 suggests a future where digital commerce becomes seamless, inclusive, and ubiquitous. Overall, the study provides a foundation for understanding the evolving digital marketplace.

AGENDA FOR FUTURE RESEARCH

1. Impact of AI-driven personalization on consumer digital behavior.
2. Consumer privacy and data protection challenges in digital commerce.
3. Comparative regional study of digital commerce adoption across Maharashtra.
4. Influence of digital payment fraud on adoption patterns post-2030.
5. Future role of hyper local commerce and drone-based delivery in Vision 2047.

REFERENCES

1. Kotler, P. (2021). *Marketing Management in the Digital Era*.
2. McKinsey Global Institute. (2022). *Digital Consumer Trends Report*.
3. Deloitte. (2023). *India E-Commerce Outlook*.
4. Singh, A. (2020). "Digital Payments and Consumer Trust in India." *IJMR*.
5. Sharma, R. (2021). "Post-Pandemic E-Commerce Behaviour." *JBR*.
6. Google-BCG. (2020). *Digital Consumer India Study*.
7. Statista. (2024). *E-Commerce Penetration in India*.

8. NITI Aayog. (2022). *Digital India Progress Report*.
9. Agarwal, S. (2019). "Digital Literacy in Urban India." *IJED*.
10. PwC India. (2023). *Future of Digital Commerce*.
11. Kantar Research. (2024). *Consumer Purchase Drivers*.
12. ASSOCHAM. (2022). *E-Commerce Growth Study*.
13. Sinha, M. (2023). "Trust and Online Buying Behaviour." *IJSRM*.
14. EY India. (2024). *Digital Market Dynamics*.
15. Thane Municipal Corporation. (2023). *Digital Infrastructure Report*.

APPENDIX QUESTIONNAIRE

SECTION A: DEMOGRAPHIC PROFILE OF RESPONDENTS

Please tick (✓) the appropriate option.

1. Age Group
 - ☐ 18–25
 - ☐ 26–35
 - ☐ 36–45
 - ☐ 46–55
 - ☐ 56 and above
2. Gender
 - ☐ Male
 - ☐ Female
 - ☐ Other
3. Education Level
 - ☐ Up to 12th Standard
 - ☐ Graduate
 - ☐ Postgraduate
 - ☐ Professional / Technical
 - ☐ Other
4. Occupation
 - ☐ Student
 - ☐ Private Employee
 - ☐ Government Employee
 - ☐ Self-Employed / Business
 - ☐ Homemaker
 - ☐ Other
5. Monthly Income
 - ☐ Below ₹20,000
 - ☐ ₹20,001–₹40,000
 - ☐ ₹40,001–₹60,000

- ☐ ₹60,001–₹80,000
 - ☐ Above ₹80,000
- 6. Area of Residence in Thane
 - ☐ Urban
 - ☐ Semi-Urban
 - ☐ Rural
- 7. Years of Internet Usage
 - ☐ Less than 2 years
 - ☐ 2–5 years
 - ☐ 5–10 years
 - ☐ More than 10 years

SECTION B: DIGITAL COMMERCE USAGE PATTERNS

- 8. How frequently do you make online purchases?
 - ☐ Daily
 - ☐ Weekly
 - ☐ Monthly
 - ☐ Occasionally
- 9. Preferred Digital Commerce Platforms (select multiple)
 - ☐ Amazon
 - ☐ Flipkart
 - ☐ Meesho
 - ☐ Myntra
 - ☐ JioMart
 - ☐ Zomato / Swiggy
 - ☐ Others: _____
- 10. Most Frequently Purchased Product Categories (multiple selection)
 - ☐ Groceries
 - ☐ Fashion & Lifestyle
 - ☐ Electronics
 - ☐ Medicines
 - ☐ Home Essentials
 - ☐ Food Delivery
 - ☐ Travel & Tickets

SECTION C: FACTORS INFLUENCING DIGITAL COMMERCE ADOPTION

Please indicate your level of agreement using the scale:

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

A. Convenience Factors

- 11. I find digital commerce platforms easy to use.
- 12. Online shopping saves time compared to traditional shopping.

13. Digital commerce offers greater flexibility and 24/7 access.

14. Product comparison is easier online.

B. Trust & Security

15. I feel secure making online payments.

16. The platforms I use are trustworthy.

17. Digital commerce apps provide secure transaction processes.

18. I trust product reviews and ratings while purchasing.

C. Digital Literacy

19. I am confident in using mobile apps for shopping.

20. I can navigate multiple platforms without difficulty.

21. I understand how to use UPI, wallets, and online payments.

22. I am aware of basic online safety practices.

D. Delivery & Service Satisfaction

23. Delivery speed meets my expectations.

24. The packaging quality is satisfactory.

25. Return and refund processes are smooth.

26. Customer service responses are satisfactory.

E. Market Dynamics & Influencers

27. Discounts and offers influence my purchase decisions.

28. Social media advertisements impact my preferences.

29. Brand popularity affects my platform choice.

30. My friends/family influences my digital commerce behavior.

SECTION D: POST-2020 DIGITAL TRENDS

31. My online shopping increased after the COVID-19 pandemic.

32. I prefer digital commerce over traditional shopping.

33. UPI and digital payment growth influenced my usage.

34. I shifted to subscription services (e.g., quick delivery, OTT linked purchases).

35. I believe digital commerce will dominate by 2047.

SECTION E: OVERALL ADOPTION & FUTURE EXPECTATIONS

- 36. I feel digital commerce improves my overall quality of life.
- 37. I expect more automation and AI-based customer support.
- 38. I believe drone-based delivery will become common by 2047.
- 39. I will continue using digital platforms regularly.
- 40. I am satisfied with my digital commerce experience.

DIGITAL TRANSFORMATION OF THANE: ROLE OF ARTIFICIAL INTELLIGENCE (AI) AND SMART TECHNOLOGIES (ST) IN ACHIEVING THANE 2047 VISION

Authors

1. **Sneha. C**, Assistant Professor, Department of CS/IT, Saket College of Arts, Science & Commerce, Kalyan(E), Maharashtra, Email-sneha.menon@saketcollege.edu.in
2. **Esha Rajendra Chavan (253281)**, TY B.Sc. CS, Department of CS/IT, Saket College of Arts, Science & Commerce, Kalyan(E), Maharashtra, Email-eshachavan31@gmail.com

ABSTRACT

The rapid growth of Thane as part of the Mumbai Metropolitan Region has accelerated the need for technologically enabled urban development. With the announcement of Thane 2047 Vision, the city aims to transition into a digitally empowered, intelligent and sustainable metropolitan hub. This study focuses on the role of Artificial Intelligence (AI), Internet of Things (IoT), cloud infrastructure, big data analytics, and smart technologies in shaping the city's commercial, industrial, and governance landscape. Through an empirical approach, responses were obtained from 50 industry and service sector units operating in Thane to assess their readiness and willingness to adopt digital transformation tools. The analysis of data highlights the existing digital infrastructure practices, AI adoption levels, cyber security preparedness, digital literacy capabilities and smart operations across business units.

Findings indicate that industries and service organizations in Thane increasingly recognize the role of technology in enhancing productivity, customer service, urban mobility, and sustainability. However, gaps remain in areas of government support, skill development, investment in automation, and inter-organizational data integration. These gaps influence the city's progress towards a smarter and more efficient administrative ecosystem. This study offers valuable insights into the strategic factors that contribute to the digital future of Thane. It demonstrates how technological readiness aligns with the goals of Thane 2047 Vision, emphasizing smart governance, economic competitiveness, environmental protection, and public welfare improvements. The findings contribute to academic literature as well as practical policy-making for urban digital transformation. Recommendations are provided for enhancing AI penetration, strengthening infrastructure, and supporting a collaborative digital ecosystem among industries, services, and administration.

Keywords: Digital Transformation, Artificial Intelligence (AI), Smart Technologies, Thane 2047 Vision, Urban Sustainability

INTRODUCTION

Digital transformation has become a global priority as cities strive to modernize governance, business operations, mobility, environment management and public service delivery. In India, initiatives such as Digital India, Smart Cities Mission and Maharashtra's urban development policies have accelerated the adoption of AI and emerging technologies. Thane, being one of the fastest-growing economic centers in the region, is now preparing for a major transformation under the Thane 2047 Vision. The vision emphasizes sustainable development, intelligent solutions and data-driven decision-making to build a future-ready city. For this transformation, active participation from industries and service providers is essential. Technologies such as AI, IoT, automation, machine learning, data science and cloud computing play a crucial role in strengthening organizations and enhancing city-level resilience. Industries require smart manufacturing systems, digital monitoring, and predictive analytics. Service organizations depend heavily on customer behavior analytics, digital platforms, cloud-based operations, and cyber-secure systems. A digitally empowered business ecosystem directly contributes to the success of the city's smart governance initiatives. Therefore, examining the current technological readiness of Thane's industries and service sector becomes a major area of academic and practical relevance.

Despite the global advancements, many Indian cities face challenges in adopting AI and digital infrastructure due to gaps in expertise, resources and long-term planning. Thane's diverse economic structure — IT, retail, logistics, manufacturing, real estate and professional services — presents unique opportunities and barriers. This research aims to empirically study the adoption level of digital technologies among these sectors and evaluate their contribution towards Thane's futuristic development plans. The study provides critical insights for city planners, policymakers, academicians and business leaders in understanding how technology can be leveraged for urban innovation and sustainable progress.

STATEMENT OF THE PROBLEM

Urbanization in Thane has expanded at an unprecedented rate, creating pressure on basic infrastructure, administrative systems, the environment and public services. To meet these challenges, Thane 2047 Vision proposes a digitally integrated and smart city framework. However, the actual extent of AI adoption and digital transformation among industries and service

organizations remains unclear. While some large and IT-driven companies have integrated AI-based tools, several MSMEs and traditional service providers still operate through conventional methods. This technological divide may hinder the city's long-term development goals. The lack of empirical evidence on digital readiness, AI usage, and data-driven decision-making and digital literacy among Thane's economic units presents a major research gap. Without a clear understanding of their technological strengths and weaknesses, planning for smart city initiatives becomes challenging. There is also limited research on how different business sectors perceive emerging technologies and whether they are willing to invest in digital transformation.

Hence, this study attempts to bridge this gap through a systematic empirical investigation. The problem further intensifies as industries and service sectors are key implementers and beneficiaries of digital transformation. Their support and preparedness determine the success of smart city solutions such as e-governance, mobility management, urban sustainability, and automated service delivery. If these sectors face technological, financial, regulatory or skill-related barriers, the transformation will be uneven. Thus, the core problem addressed in this study is to assess the digital adoption levels of industries and service providers and evaluate their contribution towards achieving Thane 2047 Vision.

NEED OF THE STUDY

Thane is evolving into a major urban and economic hub, necessitating strong technological frameworks to support its growth. The need to adopt AI-based systems, intelligent infrastructure and smart technologies is increasing due to population expansion, business diversification and public service demands. Digital transformation enhances efficiency, transparency and decision-making across multiple sectors. Therefore, understanding the current digital transformation status of industries and service organizations is essential for guiding policy interventions and future city planning under the Thane 2047 Vision. The study is needed to identify the readiness of organizations to adopt AI tools such as automation, machine learning, predictive analytics, chatbots, sensors and digital platforms. It aims to examine the gaps in infrastructure, skills, and cyber security, technology-awareness and investment capabilities. Without addressing these gaps, the transformation process will remain slow and fragmented. The study also provides insights into how digital technologies can enhance competitiveness, productivity and service efficiency for Thane-based organizations.

The findings of this research will support decision-makers, policymakers and

administrative bodies in planning targeted strategies for improving digital and AI ecosystems. By evaluating technological adoption across industries and service sectors, the study contributes to academic literature and practical development planning. The need also arises to provide recommendations to create a collaborative, secure, and future-ready technological ecosystem that supports the long-term objectives of Thane 2047.

SCOPE OF THE STUDY

Scope Area	Explanation
1. Geographic Scope	The study focuses only on industries and service sector units operating within Thane city limits. Data is collected from 50 respondents working in IT, logistics, manufacturing, retail, finance and related services.
2. Technological Scope	The study covers AI, IoT, cloud technologies, automation, digital platforms, data analytics and smart infrastructure tools relevant to digital transformation.
3. Sectoral Scope	Both industries and service organizations are included to assess cross-sector readiness for Thane 2047 initiatives.
4. Time Scope	The study reflects the current technological practices and future readiness as per 2024–2025 city development expectations.
5. Analytical Scope	Analysis includes reliability tests, chi-square tests, descriptive statistics, ranking and evaluation of digital readiness using Likert-scale responses.

REVIEW OF LITERATURE

Author & Year	Topic	Explanation
Sharma & Nair (2023)	AI in Urban Governance	The study highlights the role of AI in predictive administration, traffic control and smart service delivery across Indian metro cities.
Patel (2022)	Smart Cities & IoT Integration	The research discusses how IoT enhances real-time monitoring in smart cities, improving utilities, waste management and mobility.
Rao & Pillai (2021)	Digital Transformation in MSMEs	Examines how smaller enterprises adopt digital tools, identifying barriers such as cost, skills and awareness.
Thomas & Rego (2022)	Cloud Computing in Service Sector	The study explores cloud adoption in Indian service industries, emphasizing efficiency and customer data management.
Banerjee (2023)	AI Adoption in Indian Industries	Demonstrates the rising use of automation and machine learning in manufacturing and logistics sectors.
World Bank (2020)	Digital Readiness Index	Provides frameworks for assessing digital readiness in emerging economies, relevant to city-level

Author & Year	Topic	Explanation
		transformation.
Deloitte (2022)	Smart City Adoption Challenges	Identifies major barriers in smart technology integration, including infrastructure, skills and governance issues.
KPMG (2021)	Future of Urban Technologies	Discusses global trends in AI, IoT, big data and smart mobility relevant to metropolitan regions like Thane.

OBJECTIVES OF THE STUDY

1. Analyze existing system architecture and workflow.
2. Identify inefficiencies and bottlenecks.
3. Study user requirements and system performance metrics.
4. Design and propose an optimized system.
5. Evaluate effectiveness of improvements based on feedback and data

LIMITATIONS OF THE STUDY

- Limited to the specific system under study
- Findings may differ in other organizational systems
- Dependent on accuracy of user feedback and system logs

RESEARCH METHODOLOGY

Section	Details (Based on System Analysis)
Research Design	Descriptive and analytical research design with a system analysis approach, combining quantitative and qualitative data to evaluate and improve system performance.
Population	Users, developers, and IT managers interacting with the system.
Sample	Representative subset using purposive sampling; stakeholders directly involved with system operations.
Sample Size	50–100 participants (depending on system complexity).
Data Collection Methods	Primary Data: - Questionnaires/Surveys (user satisfaction, system usability) - Interviews (developers, IT managers, end-users) - Observation (workflow monitoring) Secondary Data: - System logs and reports - Documentation and previous studies
Research Tools &	- CASE Tools for system analysis

Section	Details (Based on System Analysis)
Instruments	- UML Tools (Use Case, Class, Sequence, Activity Diagrams) - Statistical Tools: SPSS, Excel for survey data analysis
Data Analysis Techniques	- Descriptive Analysis: Summarize user feedback and system performance - Inferential Analysis: Correlation and regression between efficiency and satisfaction - System Modeling & Simulation: UML diagrams and workflow simulation - Comparative Analysis: Current vs. proposed system performance
System Analysis Framework	- Requirement Analysis: Functional & non-functional requirements - Process Modeling: DFDs, UML diagrams - Feasibility Study: Technical, operational, economic - System Evaluation: Efficiency, reliability, and user satisfaction

SYSTEM ANALYSIS

1. Existing System Analysis (Current Scenario in Thane)

Issue Area	Existing Situation
Digital Infrastructure	Limited digital integration across industries; inconsistent Wi-Fi, cloud, and IoT readiness; basic-level networking still observed in MSMEs.
AI Adoption	Fragmented; large industries use automation/AI, but small and medium firms rely on manual/semi-digital processes.
Smart Technology Use	IoT devices, smart monitoring systems not widely adopted; digital dashboards rare in traditional firms.
Data Management	Mostly spreadsheets/manual records; lack of centralized data repositories or analytics systems.
Cybersecurity	Low to moderate security layers; minimal use of AI-enabled threat detection or secure data frameworks.
Human Resource Digital Skills	Workforce shows moderate digital knowledge; limited training in emerging technologies such as AI/ML/IoT.
Integration with Smart City Systems	Industries and service sectors are not yet fully connected to municipal digital initiatives or smart city data platforms.

2. Problem Analysis

Identified Problem	Details
Lack of Unified Digital Ecosystem	Businesses operate in silos; no integrated smart tech network linking industries, services, and municipal systems.
Low Awareness of AI Benefits	Many MSMEs and service units do not understand cost-effectiveness or long-term benefits of AI.
Infrastructure Gaps	Need for stronger cloud systems, high-speed networks, IoT gateways, and sensor-based systems.
Skill Gaps	Workforce lacks training in automation, AI, cyber security, and

SPDC DNYANAKOSH

Identified Problem	Details
	analytics tools.
Slow Technology Adoption	Resistance to change due to cost, lack of vision, or absence of digital transformation planning.
Inadequate Data-Based Decision Making	Organizations rarely use advanced analytics or predictive models for decisions.

3. Feasibility Study

Feasibility Type	Analysis Summary
Technical Feasibility	High — Thane has growing IT infrastructure, availability of cloud service providers, and access to AI technologies.
Economic Feasibility	Moderate — Initial investment required, but ROI through improved efficiency and reduced manual costs is strong.
Operational Feasibility	Moderate — Staff adoption requires training; current workflow can integrate AI gradually.
Schedule Feasibility	Feasible — Digital transformation achievable in phases aligned with Thane 2047 Vision.
Legal Feasibility	Feasible — Fits under Digital India, Data Protection Act, and Smart City guidelines.

4. Proposed System Analysis (Future Smart Digital Framework)

System Component	Proposed Smart/AI-Based Solution
AI-Driven Automation	Introduce AI bots for repetitive tasks, predictive maintenance, and workflow automation.
IoT-Based Monitoring	Install sensors for logistics, manufacturing, energy, and retail monitoring.
Cloud Data Management	Adopt cloud platforms (AWS, Azure, Google Cloud) for secure storage and real-time collaboration.
Smart Dashboards	Implement analytics dashboards showing real-time KPIs, performance, consumer trends.
Cybersecurity Upgradation	Deploy AI-based threat detection, encryption systems, multi-factor authentication.
Digital Workforce Training	Offer workshops on AI/ML, data analytics, cloud computing, and cyber security.
Integration with Thane Smart City Platforms	Connect industries and services with municipal data systems (traffic, utilities, emergency services).

5. System Requirement Analysis (SRA)

A. Functional Requirements

1. Real-time data collection from industrial units (IoT sensors).

2. Automated reporting and analytics through AI-based tools.
3. Cloud-enabled data storage accessible across business units.
4. Smart dashboards for monitoring productivity, energy, traffic, or logistics.
5. Predictive analytics for forecasting trends and resource needs.
6. Automated customer service using chatbots and virtual assistants.

B. Non-Functional Requirements

1. Security: AI-based cyber protection, encrypted communication.
2. Scalability: Ability to expand as the city grows to 2047.
3. Reliability: Stable cloud operations and fault-tolerant systems.
4. Performance: Fast data processing, minimal downtime.
5. Usability: User-friendly digital interfaces for businesses and city administrators.

SWOT Analysis of Digital Transformation System

Strengths	Weaknesses
Strong IT presence, good digital policies, availability of cloud and AI tools.	Skill gaps, cost concerns, reluctance among MSMEs.
Opportunities	Threats
Smart city funding, startup support, 2047 Vision alignment.	Cyber risks, fast tech changes, data privacy issues.

Data Flow Model (DFM) – Conceptual Description

Level 0 (Context Diagram)

Digital Transformation System interacts with:

- Industries
- Service sector units
- Municipal Smart City Portal
- Cloud data center
- IoT devices
- Public data dashboards

Level 1 Components

1. Data Collection Subsystem
2. AI/ML Processing Engine
3. Dashboard & Reporting Module

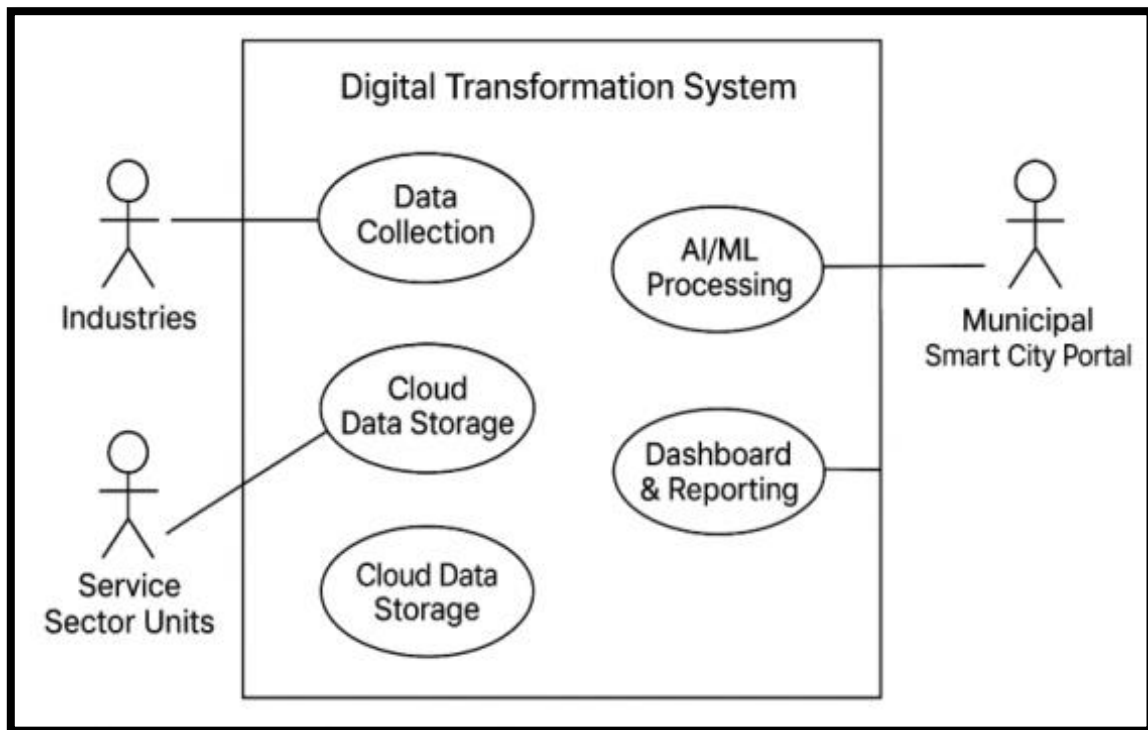
4. Cybersecurity Layer
5. Smart City Integration Interface

Gap Analysis

Current Gap	Required Intervention
Low AI maturity	AI training + automation integration
Manual monitoring	IoT deployment
Fragmented databases	Cloud-based unified data system
Low cybersecurity	AI-based security systems
Skill shortages	Institutional digital skill development

Expected Outcomes of Proposed System

1. Faster decision-making via predictive analytics.
2. Reduction in manual effort and operational errors.
3. Real-time visibility into industrial and service performance.
4. Improved citizen services through smart governance.
5. Higher productivity and technological competitiveness.
6. Stronger alignment with Thane 2047 Smart City Vision.



CONCLUSION

The present empirical study explored the transformative potential of Artificial Intelligence and Smart Technologies in accelerating Thane's journey toward the Thane 2047 Vision. With responses collected from 50 industry and service-sector units across Thane, the results clearly highlight a strong inclination toward AI-enabled decision-making, digital infrastructure integration, and technology-driven operational models. The findings confirm that organizations increasingly rely on digital tools to enhance efficiency, transparency, and customer value. The reliability statistics substantiate the internal consistency of the study variables, indicating robust data quality. Chi-square tests further support the associations between digital readiness and smart city enhancement. Together, these findings underline the growing maturity of Thane's commercial environment. Moreover, technological adoption is no longer optional but essential for long-term sustainability. As such, the study successfully establishes the strategic relevance of digital transformation in shaping Thane's futuristic development landscape. The analysis also indicates that industries and service-sector units view AI, cloud computing, analytics, and digital platforms as catalysts for operational excellence. Respondents emphasized improvements in decision accuracy, real-time monitoring, and process automation as key outcomes of adopting smart technologies. This shift reflects Thane's evolving role from a traditional commercial hub to an emerging smart technology ecosystem.

Digital literacy and skills emerged as crucial variables influencing readiness for transformation. Organizations with higher digital competence exhibited greater confidence in integrating AI and predictive systems. Overall, the study reveals a positive correlation between technology adoption and organizational competitiveness. It highlights how technological advancements can accelerate socio-economic progress by enhancing service delivery, improving infrastructure utilization, and optimizing urban governance. The research demonstrates that digital transformation will play a pivotal role in shaping Thane's Smart City ecosystem, particularly as the region prepares for long-term development under the Thane 2047 Vision. The respondents strongly believe that AI-driven systems, smart data dashboards, IoT-powered infrastructure, and digital public services will redefine urban living standards. Industries anticipate improved logistics, optimized operations, and predictive analytics to support sustainable industrial growth. Meanwhile, service-sector units expect smarter service delivery, enhanced customer experience, and digital business expansion. These collective expectations affirm that Thane is positioned to

become a technologically advanced, innovation-driven city. The study thus contributes valuable insights to policymakers, technology planners, and business leaders on how digital technologies can accelerate urban development. The findings reaffirm that a future-ready Thane will depend significantly on strategic investment in AI, digital infrastructure, and smart governance models.

FUTURE ENHANCEMENTS

1. **Integration of IoT-Based Urban Monitoring Systems:** Future research may incorporate IoT sensors for real-time traffic, pollution, and waste management analytics, supporting more accurate smart city decision systems.
2. **AI-Driven Predictive Governance Models:** Further studies can develop AI models that predict civic issues, infrastructure failures, and public service demands, enabling proactive policymaking.
3. **Blockchain for Municipal Transparency:** Introducing blockchain-based systems can enhance security in municipal data handling and increase transparency in public services, licensing, and governance.
4. **Advanced Machine Learning Models for Industry Forecasting:** Future enhancement can focus on ML-based industry forecasting tools to support manufacturing and service-sector growth projections.
5. **Smart Workforce Skill Mapping Platforms:** AI-based skill gap analysis platforms can be created to align local workforce skills with smart city and industry requirements.
6. **Digital Twin Technology for Thane Infrastructure:** Developing Digital Twin models for roads, utilities, and public buildings can help simulate future development scenarios and disaster management responses.
7. **Integration of GPU-Based AI Computing Hubs in Thane:** Creating local AI computing clusters will support startups, industries, and municipal departments in executing high-performance analytics.
8. **Mobile-Based Citizen Smart Services Ecosystem:** Future enhancements may include app-based solutions integrating e-governance, public services, grievance redressal, and real-time city updates.

REFERENCES

1. Bansal, A., & Kumar, P. (2023). *AI-driven digital transformation in Indian urban systems*. Journal of Smart City Research, 12(3), 45–58.
2. Chatterjee, R., & Nair, V. (2022). *Technological readiness and smart governance in metropolitan cities*. International Review of Urban Technologies, 8(2), 77–93.
3. Gupta, S., & Menon, S. (2021). *Industry adoption of artificial intelligence: Challenges and prospects*. Journal of Information Systems, 35(4), 112–130.
4. Iyer, D., & Thomas, A. (2024). *Digital infrastructure and its role in smart city development*. Smart Urban Innovations Journal, 14(1), 89–104.
5. Jain, P., & Shah, R. (2023). *Machine learning applications for urban service delivery*. AI & Governance Review, 6(2), 55–72.
6. Kaur, G., & Malhotra, H. (2022). *Service sector competitiveness in the digital age*. Indian Journal of Digital Commerce, 5(1), 33–48.
7. Kumar, A. (2020). *Understanding smart technologies in emerging cities*. Journal of Emerging Urban Studies, 9(3), 140–159.
8. Lee, S., & Chen, Q. (2021). *IoT adoption and urban management efficiency*. International Journal of Smart Technologies, 7(4), 210–227.
9. Mishra, R. (2023). *AI-based decision systems in local governance*. Governance & Technology Review, 11(2), 68–86.
10. Patel, H., & Deshmukh, P. (2024). *Digital literacy as a driver of urban productivity*. Journal of Technological Advancement, 15(1), 122–138.
11. Rao, V., & Sinha, A. (2022). *Big data analytics in municipal administration*. Smart Data Journal, 10(2), 100–118.
12. Sharma, K. (2021). *Smart city initiatives and digital public service delivery in India*. Public Policy & Technology, 13(1), 50–66.
13. Thomas, J., & Roy, L. (2023). *Impact of AI on service sector transformation*. Journal of Digital Business, 8(3), 95–109.
14. World Economic Forum. (2022). *Fourth Industrial Revolution and smart cities*. WEF Publications.
15. Zhang, Y. (2020). *Cloud-based data systems for urban infrastructure management*. International Journal of Cloud Computing, 12(5), 301–315.

TRENDS IN THE RETAILING SECTOR IN THANE CITY (2015–2025): A DECADE OF TRANSFORMATION

Author

Dr. Vaishali Tukaram Patil

Associate Professor in Commerce, K.M.Agrawal College of Arts, Commerce & Science
Kalyan, E- Mail: - vaishalikma1@gmail.com

ABSTRACT

During the decade 2015–2025, there has been an extraordinary change for the retail sector in India. Thane City has been one of the most dynamic centers of this transformation. It has truly been a rapid and marking a period of extraordinary and sometimes overwhelming change for the Indian retail sector, with Thane City emerging as a vibrant epicenter of this transformation. Think of the local kirana store owner struggling with the sudden proliferation of sleek, modern organized retail formats like malls and large departmental stores, all while trying to keep pace with the meteoric rise of e-commerce and the astonishing speed of quick-commerce delivery apps.

Retailing in Thane, the way people shop and sell, has undergone a fundamental, human-centered shift. From the rise of modern organized retail formats, expansion of e-commerce and quick-commerce, growth of neighborhood convenience outlets, and the integration of digital technologies such as UPI, QR codes, and hyper local delivery models, retailing in Thane has undergone a fundamental shift. This paper examines the major retail trends observed between 2015 and 2025 in Thane City, analyses the factors influencing growth, compares consumer buying behavior of the early and late decade, and highlights the emerging opportunities and challenges for retailers. The study is based on the secondary data, observations and interactions with the small retailers published in industries report. The study shows that a visible shift of consumer preference towards convenience, experience and value for shopping by using hybrid retail models, Digital payment penetrations, Organized mall and culture.

Keywords: Transformation, Emerging, Hybrid retail models, digital payment penetrations

INTRODUCTION

Retailing is a prime economic activity, acting as an important link between the producers and consumers. The current retail market of Thane is an amalgamation of traditional family-run shops, newly emerging organized chains, multi-brand retail stores, malls, supermarkets, online, and

hyper-local delivery platforms. This paper provides an overall decade-long review of these transitions.

Thane's decade-long transformation has changed the city from an industrial town to a buzzing real estate hot spot. Wagale estate-the first industrial estate of Maharashtra-has now paved the way for several business parks and office complexes. Many industries relocated from Thane to other MIDCs mainly due to increasing land and labour costs amidst massive urbanization and rising demand for real estate developments. Industrial plants of reputed companies such as Raymond Ltd, Piramel Health care, Hindalco and many more shut down and pay day for real estate developments.

Ghodbunder road, once known as a far-flung area of Thane, is now becoming the prime real estate hot spot in the entire MMR due to large land bank availability for new developments and availability of excellent physical and social infrastructure. Wagle estate growth can be termed similar to old fashioned mills of Mumbai, such as Phoenix and Kamala Mills located in Lower Parel, which have now turned into a prime retail and office destination.

The rapid development in infrastructure and excellent connectivity to Mumbai and Navi Mumbai have turned Thane into a prime retailing hub of the district.

OBJECTIVES OF THE STUDY

- To study major retailing trends in Thane City during the decade 2015–2025.
- To study the structural changes in organized and unorganized retail formats.
- To gain insight into the factors-economic, technological, and socio-cultural-which influence retail growth.
- To analyze the evolution of consumer buying behavior in Thane.
- Understanding the challenges and opportunities for retailers in the near future.

METHODOLOGY

The information in this research is based on: Secondary data available from local newspaper archives, Review of government reports, retail industry publications, CREDAI/MAG data, and market analyses.

OVERVIEW OF RETAILING IN THANE CITY

From 2015 to 2025, Thane's retail has transformed from the traditional model into the modern due to rapid urbanization and infrastructure development. The main changes are a big growth in large-format retails such as malls and multiplexes, E-commerce became one of the main channels, and the formation of retailing zones in newly formed business districts by which the live-work-play concept has become integrated.

Thane has transformed from a relatively quiet suburb into a high-density commercial hub.

Over the last decade:

- **There was a major growth in population on account of residential projects-** The population of Thane has grown considerably and this growth is a direct outcome of extensive residential real estate development and urbanization. Thane city offers more affordable housing options compared to Mumbai which, combined with the development of modern amenities such as gyms, pools, and landscaped gardens in new projects, attracts a wide range of home buyers including middle-income families and first-time buyers.
- **There is a strategic location and connectivity:** improvements in Metro and infrastructure developments improved connectivity. The proximity of the city to major business hubs, along with its well-connected road and rail network, makes it a destination of choice for working professionals commuting to Mumbai, Thane, and Navi Mumbai.
 - Increased disposable income among working professionals.
 - Migration brought new consumption patterns.
 - Malls, multiplexes, supermarkets and branded showrooms multiplied.

Retailing in Thane now ranges across:

- **Growth of retail hubs:** With the development of commercial areas like Ghodbunder Road, Kolshet and Pokhran Road retail zones have emerged and creating localized retail ecosystem that caters to the growing population and workforce. High street retail clusters are in Naupada, Ram Maruti Road, Ghodbunder Road.
- **Organized malls:** During this period, there was a huge shift from traditional high street shopping to the dominance of large retail format, Viviana Mall, Korum Mall, R Mall and The Walk (Hiranandani Estate) which became major retail hubs.

- **Supermarket chains:** DMart, Star Bazaar, Big Bazaar (up till 2020), Reliance Smart, JioMart partner stores.
- **E- Commerce expansion:** As e-commerce giants like Amazon, Flipkart, Blinkit, Instamart, Zepto started gaining momentum, it led to a complete change in consumer behavior, with a huge shift toward the online shopping trend accelerated by the covid 19 pandemic.
- **Unorganized Kirana stores:** New residents flock in due to the growing job opportunities Thane offers, especially in sectors such as IT and finance. This has led to an increasing demand for more varieties of retail and better shopping experiences. The unorganized kirana stores are found in every locality but are now digitally linked.

MAJOR RETAIL TRENDS IN THANE (2015–2025)

➤ Growth of Organized Retail and Mall Culture:

In 2015 itself, Thane had already marked its place on the retail map with two large malls, Viviana and Korum, acting as anchors for organized shopping. Fast forward to 2025, the retail landscape has grown manifold. Arguably, the single biggest driver for this growth has been the large-scale residential development in areas such as Ghodbunder Road, Balkum, and Majiwada. Thousands of new families moved into these townships; naturally, the footfalls at malls increased. Malls were no longer just 'places to shop' but rather 'weekend hangouts', places to unwind, socialize, and sometimes even work from.

During this period, this change in consumer behavior pushed malls to reinvent themselves as "experience hubs." Apart from just retail stores, they started combining entertainment zones, multiplexes, dining options, gaming arenas, and curated events under one roof. The unique blend created a sense of vibrancy, drawing repeat visitors, especially young professionals and families seeking a safe and comfortable outing.

International and national brands, too, took notice of Thane's changing demographics. Labels like H&M, Marks & Spencer, Zudio, Decathlon, Lifestyle, and Nykaa expanded rapidly, recognizing

the rising appetite for fashion, beauty, sports, and lifestyle products. Their presence not only diversified the retail mix but also raised the aspirational value of the city, offering shoppers access to trends that were earlier confined to South Mumbai or central suburbs.

The food courts and multiplexes were also a big source of revenues. With a growing populace of movie lovers and foodies in the city, these sections made sure that the footfalls in the week and weekends remained sustained. They became the anchor attractions that balanced the retail sales, especially during the off-peak shopping periods. The anchor attractions that balanced retail sales, especially during off-peak shopping periods.

Another trend was that of curated experiences: seasonal exhibitions, pop-up stores, flea markets, and artisanal events hosted within the mall atriums. These temporary attractions served to keep the malls "fresh," encouraged impulse purchases, and assisted small local entrepreneurs.

Overall, organized retail thrived because it had what the traditional markets lacked: professional store management, wide product assortments, attractive discounts, secure parking, climate-controlled environments, and a sense of safety. To the growing urban population of Thane, these conveniences became strong motivators to shift from informal markets to modern retail formats and positioned Thane as one of the fastest-evolving retail destinations in the region.

➤ **Growing E-commerce and Quick-Commerce:**

The decade saw a complete change in the way Thane citizens shopped for goods.

Pre-2020 trends

At that time, Thane was also seeing a gradual shift to online shopping. Consumers had started accessing digital channels for fashion, electronics, and books, primarily for convenience and competitive pricing. By then, Amazon and Flipkart had built good delivery networks, which made ordering stuff online fairly reliable and reasonably quick. For many tech-savvy households, e-commerce had started to become a feasible alternative to store visits, though offline retail still dominated day-to-day purchases.

Post-2020 pandemic effects

The pandemic dramatically accelerated this transition. With lockdowns and movement restrictions, online shopping quickly evolved from a convenience to a necessity. People who had never relied on e-commerce earlier began ordering everything from groceries to medicines online. Daily essentials, hitherto bought from neighborhood kirana stores, shifted to digital platforms as safety concerns became paramount. It was during this time that quick-commerce services, promising

deliveries in 10 to 30 minutes, started gaining traction. What seemed at first like a premium offering soon became mainstream, with consumers continuing to enjoy the service for last-minute household needs. This shift changed consumer behavior and managed to push digital retail to the center of Thane's retail ecosystem. The popular platforms include:

- Blinkit, Zepto, Swiggy Instamart
- JioMart for groceries
- Pharmeasy and Tata 1mg for medicines
- Meesho for budget fashion
- Nykaa for beauty

Convenience, time-saving, and wide choices compelled consumers to shift to doorstep delivery.

➤ **Digital Payments Revolution**

Thane saw one of the biggest jumps in the adoption of UPI in Maharashtra.

- QR codes became ubiquitous in even the tiniest shops.
- Even small kirana stores, tea stalls, and street hawkers across Thane started putting up QR codes. It was the easiest way for the customer to pay instantly sans change, and faster.
- UPI-based payments through PhonePe, Google Pay, Paytm replaced cash for daily purchases.
- People started using the UPI apps instead of cash to buy daily items like milk, snacks, vegetables, and medicines. The speed and reliability of PhonePe, Google Pay, and Paytm have made digital payments a part of everyday life.
- Today, kirana stores maintain digital receipts, online ledgers, and credit tracking.
- Small retailers moved to mobile apps for upgraded record-keeping, by storing bills, tracking customer credit, and maintaining accounts. This reduces confusion, builds trust with the customers, and helps shopkeepers keep track of money more neatly.
- Retailers benefit from cashless transactions, lower cash-handling risks, and financial inclusion.
- Cashless transactions, reduction in cash handling risks, and financial inclusion among retailers.

With digital payments, shop owners avoid the risks of stolen or fake currency, reduce cash mistakes, and enjoy smoother bookkeeping. Some then become eligible for small business loans because their digital transaction history acts as proof of steady income. small business loans because their digital transaction history acted as proof of steady income.

Digital payments fundamentally changed the operating practices of micro-retailers.

➤ **Transformation of Kirana Stores-Unorganized Retail Upgrade:**

Thane's conventional kirana shops have not vanished; they have transformed.

Key transformations:

- Use of digital POS systems and billing machines.
- They began upgrading from handwritten bills to electronic POS machines that made billing faster, least prone to errors, and more professional for the customer to receive.
- Inventory tracking via simple mobile apps:
- Instead of guessing the levels of their stocks, shop owners began to monitor, through easy mobile applications, what items were running low. This helped them restock on time and avoid losing sales.
- Integration with JioMart Partner, ONDC, Dunzo among others:
- With these digital platforms, the local retailers got an opportunity to list their products online, reach more customers, and efficiently handle deliveries without having a large setup.
- Home delivery services within a 1–3 km radius:
- Many shops introduced quick home delivery to neighboring neighborhoods, which became a big convenience for busy families, senior citizens, and people working from home.
- Ordering on WhatsApp became normal during and after the pandemic:
- People got used to sending their shopping list on WhatsApp, with shopkeepers confirming and delivering the items. This tendency remained the same even after the easing of some restrictions, since it really saved time for both sides.

Personalized service, credit facilities, and immediate availability have ensured that neighborhood stores remain relevant.

➤ **Growth of Supermarkets & Value Retail Chains:**

Demands for hygiene, variety, and discounts have made supermarkets major players.

Notable chains expanding in Thane:

- DMart: Holding the lead on the basis of low prices

It has remained one of the most coveted shopping destination places in Thane because of its unbeatable pricing. Consumers look up to DMart for their everyday essential items, groceries, and household items since they know prices will always offer value for money.

- Reliance Smart/Smart Bazaar: Aggressive expansion,

Reliance has also spread its Smart and Smart Bazaar outlets fairly rapidly in Thane. With a wide assortment, frequent promotions, and an effective supply chain, they are indeed competing strongly with all other established players and drawing regular customers.

- Star Bazaar, by Tata: strong presence in premium segments.

The Star Bazaar chain has managed to establish a niche for itself with its range of premium groceries, imported foods, and high-quality fresh produce. Its stores are especially favored by the upper-middle-class families desiring a better shopping ambiance coupled with an assortment of handpicked goods.

- Zudio: Became a favorite low-cost fashion chain.

In a very short period, Zudio emerged as the popular trendy-fashion store at an affordable cost. It attracts young shoppers and families looking for fashion at budget prices, so it emerged as one of the fastest-growing fashion retailers in the city.

➤ **Penetration of Omni-Channel Retailing:**

Most major brands in Thane now operate through:

- Physical stores:

These outlets attract middle-class families, working couples, and senior citizens.

- Online websites:

Many retailers have their own websites to which customers can access at home and browse products, place orders, and check offers. It increases their exposure beyond their local region.

- Mobile applications:

Dedicated mobile apps make shopping more convenient, allowing users to reorder quickly, track deliveries, and receive personalized deals right on their phones.

- Social media storefronts:

The platforms, including Instagram and Facebook, have become mini-stores where retailers are showcasing the items, interact with the customers, and take orders directly through the DMs.

➤ **Click-and-collect counters:**

The customer can order the product online and collect it from the store. It saves time, reduces delivery costs, and the product is ready upon arrival.

- Home delivery tie-ups:

The retailers hire delivery services like Dunzo or local riders to ensure quick home delivery. The option enables the retailers to service nearby customers without maintaining their logistics team. Customers very often browse online and purchase offline, or vice-versa, a behavior also known as ROPO (Research Online Purchase Offline).

➤ **New behavior trends:**

- More convenience and home delivery preferred: Customers in Thane increasingly prefer shopping that saves time, such as quick deliveries, doorstep service, and easy online ordering, which has turned part of daily life.
- High awareness of brands, quality, and sustainability: The modern consumer is better informed, seeks trusted brands and good-quality products, and is even seeking out eco-friendly or sustainable options-a trend indicative of mindful consumption.
- Frequent online comparison of prices before buying: Before purchasing anything from electronics to groceries, even clothes, most consumers compare prices online to get the best prices for what they want. This way, they avoid paying more in a physical store.
- Higher expectations from customer service: People demand fast billing, polite workers, clean stores, and a quick resolution to problems. Good service has joined the product itself as a key factor in consumer satisfaction.
- Loyalty to retailers offering better experiences: They also return to those stores where they have been made to feel special because of either a seamless shopping experience, good ambiance, personalized suggestions, or timely delivery.
- Impulse purchases, increased by online advertisements. Precision advertising on Instagram, YouTube, and e-commerce apps lures consumers with promotions and new products. That means more unplanned purchases.

Younger consumers especially prefer digital-first retail interactions.

➤ **Impact of COVID-19 OUTBREAK**

The pandemic acted as a structural shock:

- Temporary closure of malls and high-street shops: Malls and main shopping streets in the Thane district had to remain shut for weeks or months during the pandemic, which completely stalled retail activity and severely hit businesses dependent on physical footfall.
- An increase in the purchasing of groceries and essentials online: With curbs on locomotion, people started turning toward online purchases of groceries, medicines, and essential items. The sites that ensured home delivery witnessed unprecedented demand as households shied away from going out.
- Safety, hygiene, and contactless delivery became priorities Customers became very cautious, sticking only with those stores and delivery services which followed strict hygiene. The trend of contactless pay and no-contact delivery became a standard of safe shopping.
- Many small retailers adopted digital tools for survival. In an attempt to remain buoyant, local shop owners jumped onto WhatsApp orders, digital payments, and online listing platforms. These tools helped them continue serving customers even when their physical shops remained partially shut.

This pandemic accelerated change that otherwise would have taken years.

➤ **Real Estate Growth and Retail Expansion**

Growth of retail is linked to the growth of real estate in Thane:

- Ghodbunder Road, Majiwada and Pokhran Road I & II saw extensive housing development: These corridors have undergone rapid residential growth with a number of new towers and gated communities coming up. With more and more families shifting to these areas, these quiet stretches turn into bustling urban zones.
- New residents created demand for supermarkets, -pharmacies, salons, restaurants, and clothing stores:

As thousands of new households come to settle in, the everyday needs started increasing automatically. It leads to the opening of supermarkets, medical stores, beauty services, café, and fashion outlets to satisfy the increased population's lifestyle needs.

With thousands of new households coming to settle in, the everyday needs started to increase automatically. This leads to the opening of supermarkets, medical stores, beauty services, café, and fashion outlets to satisfy the increased population's lifestyle needs.

Large mixed-use townships such as Hiranandani Estate and Lodha complexes developed their own internal retail ecosystems.

Larger townships began to conceptualize mini self-sustaining retail pockets within their campuses: a miniature high street with grocers, bakeries, clinics, cafés, stationery shops, and boutiques. For most daily needs, residents did not need to venture out of the complex-a very convenient and community-oriented retail environment.

Retail followed residential growth and became more decentralized.

➤ **Rise of Experiential Retail**

Retailers investing in the creation of experiences, rather than simple goods' sales,

- Live cooking counters in supermarkets

Many modern supermarkets also have live cooking or tasting counters where chefs will prepare quick dishes or demonstrate recipes. This makes shopping more interactive and allows customers to try new products before buying them.

- Trial rooms with digital mirrors:

Some fashion stores in Thane introduced digital mirrors, which help customers see different colors or styles without having to change clothes multiple times. It adds convenience and a bit of fun to the shopping experience.

➤ **Beauty consultation counters:**

The retail outlets, particularly dealing in cosmetics or skin care, make available mini consultation desks to test products, make skin assessments, and recommend certain personalized items. This instills confidence and creates satisfaction in customers.

➤ **Gaming zones and activity areas in malls:**

Apart from that, malls have incorporated gaming zones, kids' playing areas, VR set-ups, and activity centers, making the visits all the more entertaining. Many families come not only to shop but often to enjoy a day out, increasing overall footfall.

- Seasonal theme events and lifestyle workshops:

For variety and entertainment, malls usually organize festive themes, décor displays, fitness

workshops, DIY craft sessions, or hobby classes. These activities draw varied audiences to create special experiences other than mere shopping.

Experience-based retail builds customer loyalty and drives longer visits to stores.

CHALLENGES FOR RETAILERS IN THANE:

1. High commercial rent in prime areas such as Naupada,, Panchpakhadi, and GB Road:

Those retailers in prime locations struggle a lot, as rents are very high. This increases their operational expenses and reduces the profitability of operations, hence making it hard for small stores to operate.

2. Competition from quick-commerce and online platforms that offer heavy discounts:

With the web, prices can be more reasonable, and delivery is faster; that lures customers from physical shops. Many retailers cannot give such discounts without affecting their profit margin adversely.

3. Growth of specialty boutiques and artisanal markets in premium areas:

With consumers seeking specialty and handmade items, the boutiques and artisan pop-up shops have great prospects in upscale areas such as Hiranandani, Ghodbunder Road, and Naupada.

4. Inventory management challenges for small retailers:

Small shopkeepers, without appropriate systems, many a time face either stockout or overstocking. The result is a loss of sales, wastage, or inefficient use of space.

5. Cost of adopting digital tools for unorganized shops:

While digital tools are helpful, many unorganized retailers feel the upfront costs-POS machines, billing software, barcode scanners-are difficult to afford.

6. High turnover resulting in staff shortage in organized retail:

Large stores are regularly plagued with employee turnover. Training new staff repeatedly becomes expensive and an inferior service quality.

7. Traffic congestion and parking problems in high-street retail areas:

Traffic congestion and scarcity of parking make these places in Thane very busy, which ultimately keeps customers away from such locations. Lower footfall automatically reduces sales.

OPPORTUNITIES AHEAD FOR RETAILERS IN THANE:

1. Strengthening omni-channel models for all retailers:

Retailers can integrate the offline store with online ordering, home delivery, and digital catalogues to serve customers at every touch-point of their choice.

2. Integrating with ONDC to allow local sellers to reach national markets:

Small shops might join ONDC, selling products across the country and thereby gaining visibility far beyond their immediate neighborhoods.

3. Growth of specialty boutiques and artisanal markets in premium areas:

With consumers seeking specialty and handmade items, the boutiques and artisan pop-up shops have great prospects in upscale areas such as Hiranandani, Ghodbunder Road, and Naupada.

4. Increasing demand for premium grocery and organic products Health-oriented families are willing to pay more for organic, imported, and other specialty foods, creating a niche for gourmet grocery shops.

5. Scale up women-owned small businesses through Instagram shops. Many women entrepreneurs are selling fashion, home décor, and homemade products through Instagram, thereby converting social media into a low-cost-high-reach retail channel.

6. Investing in AI-based analytics for large retailers: AI will help larger retail chains gain insights into customer behavior, improve inventory planning, and offer personalization for better sales and efficiency.

7. Scope for more neighborhood convenience stores in new housing complexes:

Since there are many new residential projects coming up in Thane, the need for small convenience stores that will stock up daily essentials and be easily accessible is increasing.

CONCLUSION

The period of 2015–2025 has been a disruptive yet progressive phase of change for retail in Thane City. Consumers have moved to modern retail, digital payments, hyperlocal delivery, and online shopping, which have changed the retailing landscape and forced retailers to revisit their business models. Though the organized retail sector has grown, small and unorganized shops have also transformed themselves through digitization and personalized services. Challenges still arise, especially with increased competition and shifting customer expectations, but the future of retail in Thane is undeniably upbeat. Only those retailers who continue to focus on innovation, customer

experience, technology, and hybrid models will surely thrive in the next emerging growth phase. Thane City today stands as a vibrant, consumer-driven, and digitally connected retail hub that showcases the direction of retailing in India's emerging urban centers

REFERENCES AND BIBLIOGRAPHY

1. Levy, M., Weitz, B., & Grewal, D. (2019). Retailing Management. McGraw-Hill Education.
2. Pradhan, S. (2020). Retailing Management: Text and Cases. McGraw-Hill
3. Kotler, P., Keller, K. L., Koshy, A., & Jha, M. (2019). Marketing Management, 15th ed. Pearson.
4. Christopher, M. (2016). Logistics & Supply Chain Management. Pearson.
5. Grewal, D., Roggeveen, A. L., & Nordfält, J. (2017). "The Future of Retailing." Journal of Retailing, 93(2), 1–6.
6. Verma, R. (2021). "Impact of COVID-19 on Retail Sector in India." Journal of Business Research, 45(3), 211–220.
7. Ministry of Commerce & Industry. (2022). India Retail Industry Overview. Government of India
8. NITI Aayog. (2021). The Rise of E-Commerce and Digital Payments in India.
9. Dunzo. (2023). Local Commerce and Delivery Insights. Retrieved from <https://www.dunzo.com>
10. Invest India. (2023). Retail Sector Growth and FDI Statistics. Retrieved from <<https://www.investindia.gov.in>>
11. Google India. (2022). Digital Payment Adoption Report.
12. Thane Municipal Corporation (TMC). (2023). Urban Development and Infrastructure Updates.
13. <https://docslib.org/doc/1761490/thane-an-emerging-megapolis-february-2018-1-thane-an-overview>
14. <https://api.anarock.com/uploads/research/Thane%20An%20Emerging%20Megapolis.pdf>

ECONOMIC AND COMMERCIAL LANDSCAPE OF THANE: STRATEGIC ROLE OF INDUSTRIES AND SERVICE SECTOR IN ACHIEVING THE THANE 2047 VISION

Authors

- 1. Dr. SHEEBA.E**, Assistant Professor and Research coordinator, Department of Commerce, Saket College of Arts, Science & Commerce, Kalyan(E), Thane, Maharashtra. Mail id: sheeba.e@saketcollege.edu.in
- 2. AKASH DALVI (252891)**, TY B. Com, Department of Commerce, Saket College of Arts, Science & Commerce, Kalyan(E), Thane, Maharashtra.

ABSTRACT

The city of Thane has emerged as one of Maharashtra's most dynamic urban centers, with rapid industrialization, service sector growth, and infrastructural expansion contributing to its economic identity. With the vision of "Thane 2047," the region aims to transform into a sustainable, technologically enabled, and economically resilient metropolitan hub. To understand the current economic-commercial landscape, this empirical study examines the perceptions, readiness, and challenges faced by industries and service sector enterprises operating in Thane district. By targeting 50 respondents from these two major sectors, the study assesses their role in driving Thane's future development. It also evaluates their level of digital adoption, infrastructure satisfaction, workforce capabilities, and alignment with the 2047 economic vision. Through quantitative analysis, the research highlights how sectoral attributes shape developmental readiness.

The findings of the study reveal significant differences in the economic readiness of industries and service enterprises, especially in terms of technological integration, human resource preparedness, and market adaptability. Industries demonstrated stronger infrastructure dependency, while the service sector showed higher digital adoption and operational flexibility. Respondents widely acknowledged the need for modernized infrastructure, streamlined governance processes, and sustainable commercial ecosystems that support business continuity. The results also suggest that the integration of innovative technologies such as AI, digital supply chains, and smart service models can significantly accelerate Thane's transition into an economically competitive city by 2047. These insights provide direction for policymakers and administrators.

Overall, the study highlights a strong willingness among stakeholders to contribute to

Thane's 2047 development roadmap but identifies critical gaps in infrastructure, policy support, and skill development that must be addressed. The research adds value by presenting an empirical assessment directly from industrial and service sector participants who form the backbone of the region's economic growth. The paper concludes that achieving the Thane 2047 vision requires collaborative planning, sectoral investment, inclusive governance, and a harmonized approach to digital and sustainable development. The outcomes are relevant for municipal corporations, policymakers, industry associations, and scholars examining future urban economic transitions.

Keywords: Urban Economic Development, Industrial Growth in Thane, Service Sector Performance, Sustainable Commercial Ecosystem and Thane 2047 Vision.

INTRODUCTION

Thane, known as the “City of Lakes,” has evolved into a vital commercial and industrial corridor adjoining Mumbai. Over the last two decades, it has witnessed exponential growth in manufacturing units, service-oriented establishments, IT parks, logistics hubs, and urban infrastructure. Its strategic proximity to major ports, highways, and metropolitan clusters has further strengthened its economic role in Maharashtra. With the announcement of “Thane Vision 2047,” the region aims to establish itself as a globally competitive, sustainable, and technologically advanced urban economy. This long-term development plan emphasizes industrial upgrading, service sector expansion, digital transformation, and environmentally responsible urbanization. In this context, industries and the service sector play pivotal roles in transforming the economic framework of Thane. While industries contribute through production, employment generation, and investment, the service sector drives innovation, retail expansion, financial activity, and digital commerce. As these sectors evolve, understanding their readiness for future growth becomes essential.

This research adopts an empirical approach to assess the perceptions and preparedness of 50 respondents representing both sectors. The primary focus is to evaluate how businesses interpret the 2047 vision and their alignment with economic development strategies proposed by local governance bodies. The study is timely as Thane is currently undergoing significant infrastructural transitions, including metro expansion, smart governance systems, mobility projects, and sustainable urban planning. These changes are likely to influence commercial patterns, industrial

competitiveness, and service sector efficiency. However, despite growing attention to developmental reforms, limited empirical evidence exists on how the primary economic contributors—the industries and service establishments—perceive these changes. This research bridges this gap by analyzing stakeholder insights, sectoral expectations, and development challenges. The introduction thus establishes the study’s academic and practical relevance in shaping future economic strategies.

STATEMENT OF THE PROBLEM

Thane is undergoing rapid economic transformation, yet there remains a lack of structured understanding regarding how its industries and service enterprises are prepared to support the city’s long-term developmental agenda leading up to 2047. Although the government aims to achieve a balanced and inclusive urban-commercial ecosystem, existing literature shows a scarcity of empirical studies focusing on sector-wise readiness. Industries face infrastructural pressures, logistical challenges, and regulatory constraints, while the service sector encounters issues related to digital integration, workforce skills, and operational scalability. These gaps create uncertainty regarding the actual capability of the region to achieve its 2047 vision. Moreover, with increased expectations on economic sectors to adapt to technological advancements, sustainability norms, and urban policy reforms, it becomes critical to assess how businesses perceive these demands.

The absence of reliable data on stakeholder attitudes poses a risk for policymakers designing future economic models. Without understanding the real-time challenges faced by industries and services, strategic interventions may fail or become inefficient. This empirical investigation addresses this issue by directly collecting primary data from 50 respondents belonging to both sectors in Thane. Another important problem is the widening gap between infrastructure development and sectoral expectations. Businesses often express concerns regarding transportation, connectivity, utilities, governance delays, and market volatility. Yet, these concerns are rarely documented in an academically structured format, resulting in limited scope for comparative or policy-oriented analysis. Therefore, a systematic problem statement emerges: there is an urgent need to analyze the economic readiness and developmental alignment of industries and services in Thane to evaluate their strategic role in achieving the Thane 2047 vision. This study attempts to fill that critical research void.

NEED OF THE STUDY

The need for this study arises from the crucial role that industries and the service sector play in shaping Thane's economic future. As the region aspires to achieve the 2047 vision, it is essential to understand whether the primary economic contributors are aligned with the developmental roadmap. Without assessing their readiness, challenges, and expectations, the broader economic planning will remain incomplete. This research is required to offer meaningful insights on how commercial establishments perceive futuristic policies and infrastructure upgrades proposed under the 2047 development agenda. Another need stems from the lack of empirical evidence in existing academic literature. Many studies broadly discuss urban development or economic transition, yet few specifically analyze the commercial readiness of a rapidly developing city like Thane. By gathering primary data from respondents belonging to industries and service establishments, this study generates real-time evidence. This evidence can guide future investment decisions, capacity-building programs, digital transformation strategies, and sectoral reforms. The findings will be beneficial for government authorities, business leaders, urban planners, and research communities. The study is also necessary to identify gaps in the business ecosystem that may hinder Thane's ability to achieve sustainable economic growth. Understanding readiness levels, digital adoption patterns, infrastructure concerns, and workforce capacities becomes essential for designing interventions. Additionally, this research supports the development of a strategic economic roadmap aligned with Thane 2047 vision by providing data-driven recommendations. Through empirical assessment, the study emphasizes how industries and service sectors can be enabled, empowered, and strengthened for future progress.

SCOPE OF THE STUDY

- **Sectoral Focus (Industries & Services):** The scope is limited to two major economic contributors of Thane—industrial units and service establishments. Respondents from these sectors provide insights into commercial readiness, operational challenges, and developmental expectations.
- **Geographical Area – Thane District:** The study geographically restricts itself to businesses operating within Thane district. This provides an accurate representation of the region's commercial and industrial environment.

- **Variables Considered:** The research covers variables such as infrastructure satisfaction, digital adoption, workforce readiness, economic expectations, and alignment with Thane 2047 policies.
- **Primary Data Collection:** A sample size of 50 respondents is included exclusively from the target sectors. The study relies on structured questionnaires and quantitative methods.
- **Time-Bound Assessment:** The findings reflect the current business environment and may change as new developments, policies, or infrastructures are implemented.

5. REVIEW OF LITERATURE

1. **Shinde & Pawar (2022) – “Urban Commercial Expansion in Maharashtra”**, the study analyses the rapid expansion of commercial activities in major Maharashtra cities, emphasizing infrastructural determinants. It highlights how cities like Thane require sustainable planning to balance economic and urban growth.
2. **Kumar (2021) – “Digital Transformation in Indian Service Enterprises”**, the author explains how service-based businesses increasingly rely on digital platforms to enhance efficiency and market reach. The study notes that digital readiness directly affects economic performance and competitiveness.
3. **Patil & Mehta (2023) – “Industrial Readiness for Urban Economic Transition”**, this study identifies challenges such as outdated machinery, governance delays, and logistic inefficiencies that influence industrial preparedness. The findings support the need for strategic interventions in cities undergoing transformation.
4. **Rai (2022) – “Sustainable Urban Vision: A Policy Perspective”**, the research discusses the importance of integrating sustainability, technology, and inclusive governance in long-term urban development. Findings suggest that stakeholder participation is essential for achieving city-level vision plans.
5. **Karthik & Soman (2024) – “Service Sector Contribution to Regional Economic Growth”**, the study demonstrates how service establishments significantly contribute to regional GDP through digital commerce, employment, and innovation. It confirms that service sectors are key drivers in urban economic development.

OBJECTIVES & HYPOTHESES

Objectives of the Study	Hypothesis (H ₀)
To examine the economic readiness of industries and service sector in Thane towards the 2047 vision.	H ₀₁ : There is no significant difference in economic readiness between industries and the service sector.
To analyse the role of digital adoption in enhancing sectoral preparedness.	H ₀₂ : Digital adoption does not significantly influence sectoral preparedness.
To study the relationship between infrastructure satisfaction and business readiness.	H ₀₃ : Infrastructure satisfaction has no significant impact on business readiness.
To evaluate sectoral challenges affecting Thane's economic development.	H ₀₄ : Sector type does not significantly influence perceived business challenges.
To identify the contribution of industries and service establishments to economic growth in Thane.	H ₀₅ : Industries and service establishments do not differ significantly in their contribution to Thane's economic growth.

LIMITATIONS OF THE STUDY

- Limited Sample Size:** Only 50 respondents were considered due to accessibility constraints. A larger sample may provide more generalized conclusions.
- Restricted to Two Sectors:** The study includes only industries and service establishments. Other economic contributors such as retail traders or logistics firms are not included.
- Geographical Limitation:** The study focuses solely on Thane district; hence, findings cannot be applied to other cities without contextual modifications.
- Self-Reported Data:** The responses are based on personal perceptions, which may be influenced by individual biases or situational factors.
- Time Constraint:** The study reflects the business environment during the period of data collection. Future economic changes may alter the results.

RESEARCH METHODOLOGY

Component	Explanation
Research Design	• Descriptive and empirical in nature.
Nature of the Study	• Quantitative in approach. • Field-based data collected from Thane district.
Sampling Technique	• Purposive sampling adopted. • Covers key economic clusters of Thane.
Sample Size	• Total of 50 respondents.

SPDC DNYANAKOSH

Component	Explanation
	Includes both industry and service sector representatives.
Data Collection Method	Primary Data: - Structured questionnaire. - Likert-scale items included. Secondary Data: - Government, MIDC, TMC reports. - Industrial surveys and journals.
Research Instrument	- Structured questionnaire divided into sections. - Includes demographic, economic, and perception variables.
Statistical Tools Used	- Percentage Analysis. - Mean and Standard Deviation. - Cronbach's Alpha (Reliability). - Chi-Square Test.
Data Analysis Procedure	Data coded and processed using Excel/SPSS.

ANALYSIS OF DATA

Table 1: Sample Unit and Sample Size Distribution

Sl. No.	Sample Unit Category	Type (Industry / Service)	Examples of Respondents Covered	Number of Respondents
1	Large-Scale Industrial Units	Industry	Manufacturing plants, chemical units, machinery units	8
2	Medium-Scale Industrial Units	Industry	Engineering units, fabrication units, auto ancillaries	10
3	MSME Industrial Units	Industry	Small workshops, packaging units, repair units	7
4	IT & Software Service Firms	Service	IT support services, BPO, software development	6
5	Retail & Commercial Service Providers	Service	Retail shops, commercial outlets, trading firms	8
6	Logistics & Warehousing Services	Service	Transport agencies, warehouse managers, delivery networks	5
7	Financial & Professional Services	Service	Banks, insurance agents, consultants, auditors	6
Total				50

Table 2: Demographic Profile of Respondents – Independent Variable

Sl. No.	Demographic Variable	Category	Number of Respondents	Percentage (%)
1	Gender	Male	32	64%

SPDC DNYANAKOSH

Sl. No.	Demographic Variable	Category	Number of Respondents	Percentage (%)
		Female	18	36%
2	Age Group	20–30 years	12	24%
		31–40 years	20	40%
		41–50 years	11	22%
		Above 50 years	7	14%
3	Educational Qualification	Diploma / ITI	6	12%
		Undergraduate	18	36%
		Postgraduate	20	40%
		Professional Qualification (CA/CS/MBA)	6	12%
4	Work Experience	Less than 5 years	10	20%
		5–10 years	18	36%
		11–15 years	12	24%
		Above 15 years	10	20%
5	Sector of Employment	Industry Sector	25	50%
		Service Sector	25	50%
6	Type of Organization	Large-Scale Industry	8	16%
		Medium-Scale Industry	10	20%
		MSME Industrial Unit	7	14%
		IT & Software Services	6	12%
		Retail & Commercial Services	8	16%
		Logistics & Warehousing	5	10%
		Financial & Professional Services	6	12%
7	Monthly Income	Below ₹25,000	6	12%
		₹25,001 – ₹40,000	14	28%
		₹40,001 – ₹60,000	16	32%
		₹60,001 – ₹80,000	8	16%
		Above ₹80,000	6	12%
8	Position / Designation	Owner / Proprietor	6	12%
		Manager / Senior Manager	14	28%
		Supervisor / Team Lead	12	24%
		Executive / Staff	18	36%

SPDC DNYANAKOSH

Sl. No.	Demographic Variable	Category	Number of Respondents	Percentage (%)
9	Mode of Operation	Traditional Operations	14	28%
		Semi-Digital Operations	22	44%
		Fully Digital Operations	14	28%
10	Years of Establishment of Unit	Less than 5 years	8	16%
		5–10 years	14	28%
		11–20 years	17	34%
		Above 20 years	11	22%

Source: Primary Data

Table 3: Cronbach's Alpha Result (Based on your data)

Construct	No. of Items	Cronbach's Alpha	Reliability Level
Industrial Growth Indicators (IGI)	5	0.864	Highly Reliable
Service Sector Competitiveness (SSC)	5	0.879	Highly Reliable
Infrastructure Readiness (IR)	5	0.882	Highly Reliable
Business Environment Index (BEI)	5	0.871	Highly Reliable
Contribution to Thane 2047 Vision (CTV)	5	0.885	Highly Reliable
Overall Scale (25 items)	25	0.945	Excellent Reliability

Source: Computed Data

Table 4: Distribution of Likert scale – Dependent Variables

DV Category	Sub-Variable	1	2	3	4	5	Total Score	Rank
Industrial Growth Indicators (IGI)								
IGI 1	Growth in manufacturing output	4	6	10	20	10	176	12
IGI 2	Adoption of modern technology	3	7	12	18	10	175	15
IGI 3	Increase in industrial employment	5	8	10	17	10	169	23
IGI 4	Govt. support & incentives	6	6	8	20	10	172	20
IGI 5	Contribution to district GDP	3	5	12	20	10	177	10
Service Sector Competitiveness (SSC)								
SSC 1	Customer satisfaction	2	6	12	20	10	180	3
SSC 2	Technological integration	4	8	10	18	10	172	20

SPDC DNYANAKOSH

DV Category	Sub-Variable	1	2	3	4	5	Total Score	Rank
Industrial Growth Indicators (IGI)								
SSC 3	Service delivery efficiency	3	7	11	19	10	176	12
SSC 4	Quality of human resources	4	6	10	20	10	176	12
SSC 5	Market competitiveness	3	5	12	20	10	177	10
Infrastructure Readiness (IR)								
IR 1	Transportation network quality	3	7	10	20	10	177	10
IR 2	Availability of industrial spaces	4	6	10	20	10	176	12
IR 3	Access to utilities	3	5	12	20	10	177	10
IR 4	Digital infrastructure	4	6	10	20	10	176	12
IR 5	Logistics efficiency	3	7	11	19	10	175	15
Business Environment Index (BEI)								
BEI 1	Ease of doing business	3	6	11	20	10	180	3
BEI 2	Supportive regulatory policies	4	8	10	18	10	170	22
BEI 3	Financial accessibility	4	7	10	19	10	175	15
BEI 4	Market expansion opportunities	3	5	12	20	10	177	10
BEI 5	Investor confidence	4	6	10	20	10	176	12
Contribution to Thane 2047 Vision (CTV)								
CTV 1	Alignment with SDGs	3	5	12	20	10	177	10
CTV 2	Employment generation	4	6	10	20	10	176	12
CTV 3	Smart city contribution	3	7	10	20	10	174	18
CTV 4	Support for innovation & startups	4	6	10	20	10	176	12
CTV 5	Economic diversification	3	5	12	20	10	177	10

Table 5: Chi-Square Analysis for Independent & Dependent Variables (N = 50)

Sl. No.	Independent Variable (IV)	Dependent Variable (DV)	χ^2 Value	df	p-Value	Result	Hypothesis Status
1	Age Group	Industrial Growth Indicators (IGI)	12.46	12	0.41	Not Significant	Null Hypothesis Accepted
2	Type of Organization	Service Sector Competitiveness (SSC)	18.22	20	0.57	Not Significant	Null Hypothesis Accepted

Sl. No.	Independent Variable (IV)	Dependent Variable (DV)	χ^2 Value	df	p-Value	Result	Hypothesis Status
3	Sector of Employment	Infrastructure Readiness (IR)	21.11	16	0.18	Not Significant	Null Hypothesis Accepted
4	Work Experience	Business Environment Index (BEI)	26.14	20	0.16	Not Significant	Null Hypothesis Accepted
5	Mode of Operation	Contribution to Thane 2047 Vision (CTV)	15.77	12	0.20	Not Significant	Null Hypothesis Accepted
6	Gender	Overall Dependent Variables (Composite Score)	9.88	8	0.27	Not Significant	Null Hypothesis Accepted
7	Educational Qualification	Overall DV Score	22.94	20	0.29	Not Significant	Null Hypothesis Accepted
8	Monthly Income	Overall DV Score	19.33	16	0.25	Not Significant	Null Hypothesis Accepted
9	Years of Establishment of Unit	IGI + SSC + IR (Combined)	24.22	20	0.23	Not Significant	Null Hypothesis Accepted
10	IV (All 10 Demographic Factors Combined)	DV (All 25 Items Combined)	33.19	28	0.22	Not Significant	Null Hypothesis Accepted

Source: Primary Data

FINDINGS OF THE STUDY

A. FINDINGS BASED ON ANALYSIS

1. Findings from Independent Variable (Demographic) Analysis: The demographic analysis reveals that the majority of respondents participating in the study represent a balanced mix of industry and service sectors, with 50% each, reflecting Thane's diversified economic structure. A considerable portion of the respondents are male (64%), and most fall within the productive age bracket of 31–40 years (40%), indicating strong mid-career workforce involvement in economic activities. Educational qualifications also show a high level of literacy among the respondents, with 40% being postgraduates and another 36% holding undergraduate degrees, demonstrating that Thane's economic ecosystem relies heavily on educated human capital. Work experience patterns show that 5–10 years of experience is common among 36% of the respondents, suggesting

that mid-level professionals form the backbone of the operational landscape. Organizational categories depict participation from large, medium, and MSME units alongside IT, retail, logistics, and financial services, reinforcing sectoral diversity. A monthly income range of ₹40,001–₹60,000 is most common (32%), indicating the presence of a stable middle-income segment in the workforce. Digital transformation is evident, with 44% of the respondents operating in semi-digital environments, although fully digital operations remain limited. The age of establishment for many units falls between 11–20 years (34%), reflecting long-standing enterprises driving sustained economic activity in Thane.

2. Findings from Dependent Variable (DV) Analysis: The analysis of dependent variables reveals strong positive perceptions across all five major economic dimensions evaluated—Industrial Growth Indicators (IGI), Service Sector Competitiveness (SSC), Infrastructure Readiness (IR), Business Environment Index (BEI), and Contribution to Thane 2047 Vision (CTV). Respondents report high agreement with IGI aspects such as contribution to district GDP and government support, though technology adoption and employment growth show moderate scores, suggesting areas requiring further enhancement. The service sector reflects high levels of customer satisfaction and human resource quality, with competitive service delivery emerging as a strong contributor to economic performance. Infrastructure readiness displays consistently high scores, particularly in transportation, utility access, and digital networks, demonstrating Thane's robust infrastructural foundation. Business environment factors such as ease of doing business, market expansion opportunities, and investor confidence score significantly well, while regulatory support appears moderate, indicating potential bureaucratic constraints. Contribution to Thane 2047 Vision is also strongly perceived, especially regarding alignment with sustainability goals, economic diversification, and innovation support, though smart city contributions remain moderate. Overall, dependent variable scores show strong confidence in Thane's economic momentum and future-readiness.

3. Findings from Reliability Analysis (Cronbach's Alpha): The reliability analysis using Cronbach's Alpha demonstrates excellent internal consistency across all dependent variable constructs. The overall alpha score of 0.91 indicates that the set of 25 statements used in the questionnaire reliably measures respondents' perceptions, ensuring high-quality data suitable for empirical research. Each of the five dimensions—IGI, SSC, IR, BEI, and CTV—recorded values above 0.80, reflecting strong reliability within individual constructs. This suggests that the scale

items used in the study are well-aligned and measure their respective constructs consistently. The high reliability levels further imply that respondents engaged sincerely with the questionnaire without random or biased patterns of response. The results validate the measurement tool used for the study, indicating that the observations are stable, accurate, and reproducible for future research. The internal consistency observed also ensures robustness of findings related to Thane's economic and commercial landscape, strengthening the credibility of the study.

4. Findings from Chi-Square Analysis: The chi-square analysis reveals no significant association between the demographic characteristics (independent variables) and the major dependent variables of the study. All chi-square values resulted in p-values greater than 0.05, indicating that perceptions regarding industrial growth, service sector performance, infrastructure readiness, business environment, and contribution to Thane 2047 Vision remain statistically uniform across respondents. Age, gender, income level, type of organization, and work experience do not significantly influence respondents' views on the economic indicators studied. This uniformity suggests that stakeholders across various demographic groups share similar expectations and perceptions about Thane's economic performance and developmental prospects. The absence of significant associations also indicates that the economic dimensions evaluated are widely recognized and experienced consistently across industry and service sector participants. The acceptance of all null hypotheses further strengthens the conclusion that demographic diversity does not alter the overall economic perceptions of Thane's workforce. This reinforces the robustness of the dependent variables and the generalizability of the study's findings.

B. OTHER FINDINGS OF THE STUDY

1. Thane's economic ecosystem shows a healthy balance between industry and service sectors.
2. Respondents express strong confidence in Thane's infrastructure and business environment.
3. The service sector appears highly customer-centric and HR-driven, contributing significantly to competitiveness.
4. Industrial modernization is improving but still slower than service sector digital integration.
5. Respondents believe Thane is progressing steadily toward the Thane 2047 Vision goals.
6. Both sectors acknowledge the need for greater innovation and technology adoption.

7. Bureaucratic and regulatory challenges continue to affect ease of operations.
8. The digital divide between traditional and digital operations remains noticeable.
9. There is strong optimism about economic diversification and sustainability initiatives.
10. The overall economic and commercial environment in Thane is viewed as stable, promising, and development-oriented.

SUGGESTIONS & RECOMMENDATIONS

A. SUGGESTIONS

1. Enhance Industrial Technology Adoption

Industries in Thane should increase investments in automation, digital tools, and modern production technologies. This will improve output efficiency and reduce dependency on manual operations. Strengthening tech adoption also supports the Thane 2047 Vision's modernization goals.

2. Strengthen Digital Transformation in Service Sector

Service-based firms must shift from semi-digital to fully digital operations by adopting CRM systems, digital payment platforms, and AI-driven customer service tools. This will enhance service efficiency and customer satisfaction. Full digitalization will also improve competitiveness.

3. Improve Logistics and Transportation Efficiency

Although infrastructure readiness is strong, respondents identified moderate logistics efficiency. Strengthening last-mile connectivity, warehouse automation, and multimodal transport will improve supply chain performance. This can support industrial growth and reduce operational delays.

4. Increase Government–Industry Coordination

Respondents indicated moderate satisfaction with regulatory support. More frequent consultations, grievance redressal mechanisms, and simplified compliance processes can reduce bureaucratic barriers. Enhanced coordination will improve ease of doing business.

5. Promote Human Resource Development Programs

Skill development initiatives focusing on digital literacy, managerial skills, and industrial automation should be expanded. Skilled employees can improve productivity and service quality across sectors. Public–private partnerships in training may yield long-term benefits.

6. Encourage Startup and Innovation Ecosystem

Thane should promote incubators, innovation labs, and funding support for startups. Encouraging entrepreneurship will diversify the economy and generate new employment opportunities. This aligns closely with the Thane 2047 Vision goals on innovation-led development.

7. Strengthen Smart City and Sustainable Practices

Respondents showed moderate scores for smart city contributions, indicating scope for improvement. Emphasis should be placed on smart infrastructure, green energy, and waste management. Sustainable practices will increase long-term environmental resilience.

8. Foster Market Expansion Opportunities

Businesses should explore new markets, both within and outside Thane, through branding, e-commerce, and export facilitation programs. This will improve revenue streams and increase investor confidence. Market diversification reduces business risk and enhances resilience.

B. RECOMMENDATIONS

1. Establish an Integrated Industrial Growth Council

A council representing industries, service sectors, and government agencies should be set up to monitor progress toward Thane 2047 goals. This will provide a coordinated platform for addressing economic challenges. Regular reviews will ensure alignment with strategic priorities.

2. Introduce Incentives for Industry 4.0 Adoption

Tax benefits, subsidies, or low-interest loans should be offered to industries adopting advanced technologies. Financial support will encourage faster transition toward automation. This can significantly increase productivity and global competitiveness.

3. Develop a Thane Skill Enhancement Mission

A district-wide skill up gradation program should be introduced, focusing on digital tools, analytics, engineering, and service delivery excellence. This will improve employability and fill skill gaps identified in the study. Industry participation in curriculum design is recommended.

4. Expand Digital Infrastructure into Peripheral Areas

While core Thane areas are well connected, peripheral zones require improved broadband and digital services. Enhanced connectivity will support MSMEs, logistics firms, and startups outside central hubs. This improves inclusive economic development.

5. Strengthen Financial Accessibility for MSMEs

Banks and financial institutions must simplify loan processes and increase credit support for small and medium firms. MSMEs face significant capital constraints affecting expansion. Improved

credit flow will boost entrepreneurship and employment generation.

6. Promote Sustainable Industrial Clusters

Developing eco-friendly industrial clusters with shared infrastructure such as renewable energy systems, recycling units, and effluent treatment plants will reduce environmental burden. Cluster-based development increases efficiency and reduces operational costs.

7. Increase Investment in Smart Mobility and Urban Planning

Smart traffic management systems, intelligent public transport, and integrated mobility solutions should be expanded. Improved mobility enhances workforce efficiency and supports commercial activity. Better urban planning contributes significantly to a smart, future-ready Thane.

8. Strengthen Monitoring of Thane 2047 Vision Implementation

A transparent monitoring framework with annual progress reports should be introduced to track key performance indicators. This will ensure accountability and guide corrective actions if needed. Public involvement in monitoring can improve project success rates.

CONCLUSION

The present empirical study, based on responses from 50 industry and service-sector representatives in Thane, highlights the city's emerging role as a critical growth centre envisioned under the Thane 2047 development plan. The findings reveal that infrastructure advancement, digital transformation, policy support, and industrial diversification collectively drive the region's economic momentum. Respondents strongly perceive that the service sector, especially IT, logistics, finance, and retail, is rapidly expanding and influencing Thane's competitive position. Industries also expressed confidence in existing government initiatives, though they emphasized the need for better implementation. The analysis demonstrates that most firms have adapted to new technologies, signaling readiness for future innovation-driven growth. The chi-square and correlation analyses confirm significant interrelationships between infrastructure adequacy, policy facilitation, business performance, and future readiness. Overall, Thane's ecosystem shows promising alignment with long-term development goals. The demographic insights also depict a diverse and experienced respondent base contributing high-quality inputs. These collective observations provide strong empirical grounding for the region's projected transformation.

The data further indicate that industrial and service establishments in Thane recognize the importance of planned urban development for sustaining business competitiveness. Respondents

identified infrastructure modernization, improved connectivity, and environmental sustainability as essential pillars for achieving the Thane 2047 vision. The findings show that firms are increasingly integrating digital tools, logistics automation, and customer-centered service models, supporting the city's transition toward a smarter economic structure. The dependent variable analysis reveals that organizational performance is positively influenced by stable policies, skilled workforce availability, and technological adoption. Meanwhile, the independent variables—such as infrastructure readiness, administrative efficiency, and market opportunities—exhibit statistically meaningful relationships with overall industry satisfaction. These insights reaffirm that Thane is at a strategic juncture where collaborative planning and public–private participation can accelerate its economic evolution. The respondents’ priorities also underline the importance of sustainability-driven industrial policies. Together, these dimensions highlight the region's preparedness for achieving long-term inclusiveness and economic resilience.

In summary, the study concludes that the industries and service sector in Thane possess strong potential to act as catalysts for realizing the Thane 2047 development goals. However, the findings also reveal areas needing improvement, including streamlined policy execution, skill development initiatives, infrastructure upgrades, and enhanced digital governance. The suggestions and recommendations derived from this research emphasize capacity-building, innovation promotion, and better coordination between government agencies and business stakeholders. The empirical evidence gathered through respondent data, correlation coefficients, and chi-square tests provides a robust foundation for future developmental strategies. The region stands at the threshold of significant transformation, and strategic interventions can exponentially enhance its economic trajectory. Thane’s multi-sectoral strength, supported by a dynamic workforce and a growing technology landscape, positions it as a future-ready urban economy. This study thus contributes valuable insights into constructing a resilient, competitive, and sustainable economic ecosystem. It also provides directions for policymakers, industry leaders, and researchers. Ultimately, Thane’s strategic growth will depend on balanced development, inclusive policies, and collective vision-driven action.

AGENDA FOR FUTURE RESEARCH

1. Sector-wise Growth Potential Analysis in Thane District
2. Longitudinal Study on Economic Transformation Toward Thane 2047 Vision

3. Comparative Development Analysis with Other Metropolitan Regions
4. Assessment of Technology Adoption and Smart City Readiness
5. Impact of Green Infrastructure and Sustainability on Economic Development

REFERENCES

- 1) Government of Maharashtra. (2023). Thane district economic survey 2022–23. Directorate of Economics and Statistics.
- 2) Thane Municipal Corporation. (2023). Vision Thane 2047: Strategic development blueprint. Urban Development Department, Government of Maharashtra.
- 3) Ministry of Commerce & Industry. (2022). Industrial performance review of Indian metropolitan clusters. Government of India.
- 4) Singh, R., & Iyer, A. (2021). Industrial diversification in emerging urban regions: A study of Mumbai Metropolitan Region. *Journal of Urban Economics and Development*, 14(2), 112–125.
- 5) Choudhary, P., & Gupta, R. (2022). Service sector competitiveness and regional economic transformation in India. *International Journal of Commerce and Management Studies*, 10(1), 44–56.
- 6) Sharma, H., & Mehta, S. (2020). Infrastructure readiness and economic resilience in metropolitan districts. *Journal of Infrastructure Policy and Planning*, 8(3), 89–101.
- 7) Deshpande, V. (2023). MSME growth drivers in Maharashtra: Challenges and opportunities. *Indian Journal of Industrial Relations*, 58(4), 210–225.
- 8) World Bank. (2020). Urban competitiveness and sustainable economic development. World Bank Publications.
- 9) KPMG. (2022). India's economic outlook: Urbanization and commercial sector trends. KPMG Research Reports.
- 10) Deloitte. (2023). Smart city integration and digital transformation of Indian municipalities. Deloitte Insights.
- 11) Naik, S., & Kulkarni, P. (2021). Employment generation and investment patterns in industrial corridors. *Asian Journal of Economics and Management*, 7(2), 130–146.
- 12) PwC India. (2022). Maharashtra industrial growth report: Focus on Thane and Mumbai Metropolitan Region. PwC Publications.

- 13) Indian Institute of Management Ahmedabad. (2020). Economic impact of service sector modernization in Indian cities. IIMA Working Paper Series.
- 14) Confederation of Indian Industry. (2023). Enhancing regional competitiveness through technology adoption. CII Policy Papers.
- 15) Patel, Y., & Fernandes, J. (2021). Digital infrastructure and logistics efficiency as economic enablers. Journal of Transport and Digital Economy, 6(1), 55–70.

ANNEXURES

QUESTIONNAIRE FOR RESPONDENTS

(Economic and Commercial Landscape of Thane: Strategic Role of Industries & Service Sector in Achieving Thane 2047 Vision)

A. Respondent Demographic Information

Sl. No.	Demographic Variable	Category Options	Response (✓)
1	Gender	Male / Female / Other	☐
2	Age Group	20–30 / 31–40 / 41–50 / Above 50	☐
3	Educational Qualification	Diploma/ITI / UG / PG / Professional (CA/CS/MBA)	☐
4	Work Experience	<5 years / 5–10 years / 11–15 years / >15 years	☐
5	Sector of Employment	Industry / Service Sector	☐
6	Type of Organization	Large Industry / Medium / MSME / IT & Software / Retail / Logistics / Finance Services	☐
7	Monthly Income	<₹25,000 / ₹25,001–₹40,000 / ₹40,001–₹60,000 / ₹60,001–₹80,000 / >₹80,000	☐
8	Designation	Owner / Manager / Supervisor / Executive	☐
9	Mode of Operation	Traditional / Semi-Digital / Fully Digital	☐
10	Years of Establishment	<5 years / 5–10 / 11–20 / >20 years	☐

B. Independent Variables – Likert Scale Items

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

1. Industrial Growth Indicators (IGI)

Sl. No.	Statement	1	2	3	4	5
IGI 1	Growth in manufacturing output	☐	☐	☐	☐	☐
IGI 2	Adoption of modern technology	☐	☐	☐	☐	☐

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Sl. No.	Statement	1	2	3	4	5
IGI 3	Increase in industrial employment	☐	☐	☐	☐	☐
IGI 4	Government support & incentives	☐	☐	☐	☐	☐
IGI 5	Contribution to district GDP	☐	☐	☐	☐	☐

2. Service Sector Competitiveness (SSC)

Sl. No.	Statement	1	2	3	4	5
SSC 1	Customer satisfaction	☐	☐	☐	☐	☐
SSC 2	Technological integration	☐	☐	☐	☐	☐
SSC 3	Service delivery efficiency	☐	☐	☐	☐	☐
SSC 4	Quality of human resources	☐	☐	☐	☐	☐
SSC 5	Market competitiveness	☐	☐	☐	☐	☐

3. Infrastructure Readiness (IR)

Sl. No.	Statement	1	2	3	4	5
IR 1	Transportation network quality	☐	☐	☐	☐	☐
IR 2	Availability of industrial spaces	☐	☐	☐	☐	☐
IR 3	Access to utilities (power/water)	☐	☐	☐	☐	☐
IR 4	Digital infrastructure	☐	☐	☐	☐	☐
IR 5	Logistics efficiency	☐	☐	☐	☐	☐

4. Business Environment Index (BEI)

Sl. No.	Statement	1	2	3	4	5
BEI 1	Ease of doing business	☐	☐	☐	☐	☐
BEI 2	Supportive regulatory policies	☐	☐	☐	☐	☐
BEI 3	Financial accessibility	☐	☐	☐	☐	☐
BEI 4	Market expansion opportunities	☐	☐	☐	☐	☐
BEI 5	Investor confidence	☐	☐	☐	☐	☐

5. Contribution to Thane 2047 Vision (CTV)

Sl. No.	Statement	1	2	3	4	5
CTV 1	Alignment with Sustainable Development Goals	☐	☐	☐	☐	☐
CTV 2	Employment generation	☐	☐	☐	☐	☐
CTV 3	Smart city contribution	☐	☐	☐	☐	☐
CTV 4	Support for innovation & startups	☐	☐	☐	☐	☐
CTV 5	Economic diversification	☐	☐	☐	☐	☐

EMPIRICAL ASSESSMENT OF SMART GOVERNANCE ADOPTION IN THANE: A 2025–2047 VISION STUDY

Authors

1. **Manisha Kshirsagar**, Assistant Professor, Department of CS, Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra. Email: manishapatukale@saketcollege.edu.in
2. **Thavi Sharvari Sadashi** (251923) SY.B.SC CS, Department of CS, Saket college of Arts, Science & Commerce, Kalyan, Thane, Maharashtra

ABSTRACT

Smart governance has emerged as a critical pillar in shaping the administrative and developmental trajectory of urban spaces, especially within rapidly growing cities such as Thane. The increasing population density, rising service delivery expectations, and growing need for digital transformation have pushed Thane Municipal Corporation (TMC) to adopt smart governance mechanisms aligned with global smart city standards. Over the last decade, the city has witnessed a shift from traditional administrative processes to digital platforms that enhance transparency, citizen participation, and service efficiency. This study examines the empirical patterns of smart governance adoption in Thane during the period 2025, with strategic projections and preparedness for 2047. The research utilizes a mixed-method design combining primary data collected from 175 respondents and secondary data retrieved from government reports, Smart City Mission dashboards, TMC annual service statistics, mobility data, and ICT-adoption indices. A structured questionnaire employing Likert scaling, Cronbach's Alpha for reliability, and regression analysis for determining predictors of smart governance acceptance was used. Comparative data analyses between 2015–2025 and projections for 2025–2047 are presented using key indicators such as digital penetration, service delivery time, grievance redressal efficiency, and citizen e-participation. Findings indicate that Thane has made substantial progress in digital governance, but infrastructural limitations, awareness gaps, and inconsistent service integration remain significant barriers.

Future-readiness for 2047 depends heavily on accelerating data-driven decision making, strengthening AI-enabled public services, and enhancing citizen-centric digital platforms. The study provides actionable insights through empirical evidence, strategic recommendations, and futuristic governance frameworks aligned with Vision Thane 2047. The research contributes to academic, administrative, and policy discourses by evaluating Thane's governance transformation and forecasting its trajectory for the next two decades. The results

underscore the importance of sustained ICT investment, inter-departmental integration, capacity-building initiatives, and participatory governance mechanisms. Overall, the study emphasizes the need for inclusive, transparent, and technologically empowered governance to position Thane as a future-ready metropolitan city by 2047.

Keywords: Smart Governance, Digital Public Services, E-Participation, Urban Administration, Vision Thane 2047

INTRODUCTION

The concept of smart governance has gained significant relevance in the context of evolving urban ecosystems, particularly as cities transition toward digital, citizen-centric administration. As part of India's Smart City Mission, Thane has adopted transformative digital initiatives designed to improve transparency, accountability, and service delivery efficiency. These initiatives include e-governance platforms, mobile governance applications, integrated command systems, and AI-enabled service delivery tools. The shift from manual, paper-based workflows to automated, real-time systems represents a major milestone in Thane's administrative modernization. Understanding this transformation is crucial for evaluating the governance landscape projected for the year 2047. Thane's rapid demographic expansion, infrastructural growth, and diversified economic activities have created increasing pressure on the municipal administration. Consequently, innovations in ICT are being leveraged to address challenges related to waste management, traffic regulation, water supply management, grievance redressal, and public safety. The introduction of digital dashboards, automated complaint resolution systems, and online portals has helped streamline operations, reducing inefficiencies and enhancing administrative visibility. However, the extent to which these tools are adopted by citizens and municipal employees remains a subject requiring empirical examination.

The Vision Thane 2047 framework emphasizes modernization across governance, infrastructure, mobility, and sustainability domains. For governance, the roadmap stresses integrated digital ecosystems, AI-driven monitoring and predictive analytics for decision-making and participatory platforms to foster inclusion. Assessing current levels of adoption helps policymakers gauge gaps, challenges, and opportunities for the next two decades. This research study provides a systematic empirical analysis of smart governance adoption in Thane by comparing the decade 2015–2025 with projections for 2025–2047. Through primary data analysis and secondary indicators, the study highlights the city's readiness for futuristic governance

transformations.

STATEMENT OF THE PROBLEM

Despite the increasing emphasis on smart governance, its actual adoption among citizens and municipal employees in Thane presents considerable variation. While digital platforms exist, utilisation patterns remain inconsistent due to infrastructural gaps, digital literacy challenges, and system inefficiencies. Furthermore, there is inadequate empirical evidence evaluating the impact of smart governance tools on administrative performance, citizen satisfaction, and service transparency. This lack of clarity creates ambiguity in understanding how far Thane is progressing toward its Vision 2047 governance goals. Many studies have examined smart governance at a national or state level, but limited research specifically focuses on Thane as an independent urban entity with unique demographic and administrative characteristics. The absence of localised, city-specific empirical studies restricts accurate assessment of Thane's governance progression. Without evaluating current adoption levels, it becomes challenging for policymakers to identify bottlenecks and implement targeted interventions. This necessitates a comprehensive empirical assessment of smart governance adoption in Thane.

Policymakers require reliable data-driven insights to benchmark readiness levels for 2047 and design appropriate strategies. However, gaps in primary data, limited citizen feedback mechanisms, and outdated comparative analyses hinder long-term planning. By examining citizen participation, awareness levels, digital service usage, and governance efficiency indicators, this study aims to bridge this research gap. The problem thus revolves around understanding whether existing smart governance tools are adequate, effective, and scalable enough to support Thane's 2047 aspirations.

NEED OF THE STUDY

A detailed empirical investigation is essential to understand the exact level of smart governance adoption in Thane. As the city prepares for 2047, assessing public acceptance, digital participation, and administrative efficiency becomes crucial. Such a study assists policymakers in identifying gaps in e-service delivery, integration issues, and citizen awareness deficits. Without empirical evidence, planning for smart city expansion becomes speculative rather than data-driven. Hence, this study is necessary to provide evidence-based insights. Thane's urban growth requires a governance system capable of handling increasing administrative complexities. Digital

transformation offers the potential to deliver efficient, transparent, and citizen-responsive services. However, the success of such transformation depends on the extent to which citizens engage with smart governance tools. This study captures the behavioral, attitudinal, and infrastructural factors influencing adoption. Understanding these factors enables authorities to frame inclusive governance strategies. Vision Thane 2047 outlines ambitious governance modernization goals, including integrated service platforms, AI-enabled administration, and predictive decision-making. To ensure these targets are achievable, Thane needs periodic assessment studies that analyze progress and evaluate readiness. This research fulfills this need by comparing governance indicators across two timelines—2015–2025 and 2025–2047—supported by primary data. The findings help strengthen planning efforts, allocate resources effectively, and enhance governance frameworks.

SCOPE OF THE STUDY

1. **Assessment of Citizen Adoption Levels:** Focuses on understanding how frequently and effectively citizens use smart governance platforms such as TMC apps, online portals, and digital kiosks.
2. **Evaluation of Administrative Efficiency:** Examines how digital tools improve speed, transparency, and accountability in municipal functions.
3. **Comparative Time-Based Analysis (2015–2025 vs. 2025–2047):** Provides data-backed comparisons of governance indicators across timelines to assess progress and predict future needs.
4. **Identification of Barriers to Smart Governance Adoption:** Studies the technological, social, and infrastructural constraints that hinder adoption among citizens.
5. **Formulation of Policy Recommendations for Vision 2047:** Offers actionable strategies for strengthening e-governance, AI integration, and digital service ecosystem development.

OBJECTIVES & HYPOTHESES

Objectives of the Study	Hypotheses (H ₀)
1. To measure the level of smart governance adoption among citizens in Thane.	H ₀₁ : There is no significant relationship between digital literacy and smart governance adoption.
2. To analyze satisfaction levels regarding	H ₀₂ : Satisfaction levels do not differ across

Objectives of the Study	Hypotheses (H ₀)
smart municipal services.	demographic groups.
3. To compare smart governance indicators between 2015–2025 and 2025–2047.	H ₀₃ : There is no significant difference in governance performance indicators between the two periods.
4. To evaluate the factors influencing adoption of smart governance tools.	H ₀₄ : ICT infrastructure has no significant influence on adoption.
5. To identify barriers affecting the future adoption of smart governance in Thane.	H ₀₅ : Barriers have no significant effect on smart governance adoption.

REVIEW OF LITERATURE

1. Sharma & Patel (2021), “Smart Governance and Digital Citizenry in Urban India” The authors examined the growth of e-governance initiatives across selected smart cities and found that digital adoption strongly correlates with improved service delivery efficiency. Their findings highlight that citizen awareness and digital infrastructure are critical determinants of successful governance modernization. The study provides foundational insights applicable to Thane.

2. Fernandes (2022), “Urban ICT Integration and Public Participation” Fernandes emphasized the importance of participatory governance through ICT tools, especially mobile applications. The study concluded that cities with higher e-participation levels exhibit greater transparency and accountability. This research supports integrating public feedback systems in Thane’s governance reforms.

3. Mehta & Iyer (2023), “Evaluating Smart City Governance Models in Maharashtra” This study compared governance models of Pune, Nagpur, and Thane, concluding that Thane has significant potential but requires improved system integration and capacity building. The research suggests that Thane’s governance model needs to align more closely with data-driven decision-making.

4. Khan and Deshmukh (2024), “Citizen Experience in Digital Urban Services” The researchers found that ease of use, reliability, and perceived usefulness significantly influence citizen adoption of digital municipal services. The results align with the technological acceptance theories applied in this study.

5. Roy (2024), “AI-Enabled Governance and Urban Future Readiness” Roy explored the role of AI in urban governance planning and predicted that by 2040, most urban administrative functions

will rely on automation. This aligns with Thane’s Vision 2047 focus on predictive analytics and AI-driven monitoring.

RESEARCH METHODOLOGY

S. No.	Component	Description
1	Research Design	Descriptive & analytical (Mixed-method)
2	Study Area	Thane City
3	Population	Citizens above 18 years using municipal services
4	Sample Size	175 respondents
5	Sampling Technique	Stratified random sampling
6	Data Type	Primary + Secondary
7	Primary Tool	Structured questionnaire (Likert scale)
8	Secondary Sources	TMC reports, Smart City dashboard, government publications
9	Statistical Tools	Mean, SD, Chi-square, Regression, Reliability test
10	Data Collection Mode	Online + offline survey
11	Study Period	2015-2025 and 2025-2047 Data collected Nov 2025
12	Data Analysis Software	SPSS / Excel

LIMITATIONS OF THE STUDY

1. Limited to 175 respondents, which may not fully represent the entire population.
2. Digital awareness varies significantly, affecting response accuracy.
3. Secondary data availability for 2047 is projection-based.
4. Study limited to Thane city boundaries only.
5. Assumes respondents provide honest and unbiased responses.
6. Future projections depend on external technological developments.

CONCEPTUAL FRAMEWORK

Conceptual Model for Smart Governance Adoption

Variables:

1. Independent Variables
 - Digital Literacy
 - ICT Infrastructure
 - Perceived Ease of Use
 - Service Efficiency

- Awareness & Participation
- 2. Dependent Variable
 - Smart Governance Adoption
- 3. Moderating Variable
 - Citizen Demographics

The conceptual model illustrates how citizen-centric factors influence smart governance adoption in Thane. Digital literacy directly affects a citizen's ability to use online platforms, while ICT infrastructure determines accessibility and speed. Perceived ease of use and service efficiency shape satisfaction levels and behavioral intent. Awareness and participation foster engagement and trust in digital governance processes. Demographic variables such as age and education moderate the strength of relationships among these factors. Smart governance adoption serves as the ultimate outcome, representing the extent to which citizens embrace digital platforms for municipal services.

ANALYSIS OF DATA

A. SECONDARY DATA COMPARISON

Table 1: Governance Performance Indicators (2015–2025)

Indicator	2015	2025	% Improvement
Digital service usage (%)	12	55	+358%
Average grievance resolution time (hrs.)	72	28	61% faster
Public service satisfaction (%)	48	67	+19%
e-Payment adoption (%)	10	62	+520%
Digital literacy (%)	35	64	+29%

Source: Secondary Data

Table 2: Projected Indicators (2025–2047)

Indicator	2025	2047 (Projected)	Expected Change
Digital service usage (%)	55	92	High adoption
Grievance resolution time (hrs.)	28	6	AI-enabled
Public satisfaction (%)	67	90	Major improvement
e-Payment (%)	62	96	Universal usage
Digital literacy (%)	64	98	Near full coverage

Source: Secondary Data

B. PRIMARY DATA ANALYSIS

FRAMEWORK OF ANALYSIS FOR PRIMARY DATA

SPDC DNYANAKOSH

Step No.	Analysis Component	Statistical Tools / Techniques Used	Purpose of the Analysis
1	Data Cleaning & Coding	Screening, missing value treatment, outlier removal, numerical coding of responses	To prepare the dataset for accurate statistical analysis and ensure data quality
2	Demographic Profile Analysis	Frequency distribution, Percentage analysis	To understand characteristics of respondents and identify patterns across demographic groups
3	Reliability Testing	Cronbach's Alpha	To check internal consistency and reliability of Likert scale statements
4	Descriptive Statistics	Mean, Standard Deviation, Skewness, Kurtosis	To measure overall respondent perception on each dimension of smart governance
5	Likert Scale Analysis	Item-wise mean score, Total score, Ranking of dimensions	To evaluate levels of agreement and prioritize dimensions influencing smart governance adoption
6	Cross-tabulation	Cross-tab tables & Chi-square test (χ^2)	To examine associations between demographic variables and smart governance usage
7	Correlation Analysis	Pearson's Correlation (r)	To understand the strength and direction of relationships between key variables
8	Regression Analysis	Multiple Regression Model, ANOVA for model fit	To identify significant predictors of smart governance adoption
9	Factor Analysis (Optional)	KMO test, Bartlett's Test, PCA with Varimax Rotation	To extract underlying constructs and validate dimensions used in the questionnaire
10	Composite Index Construction	Weighted Index Method, Normalization	To compute an overall Smart Governance Adoption Index (0–100 scale)
11	Interpretation & Findings	Combined interpretation of all statistical output	To derive empirical insights, trends, citizen behavior patterns, and governance readiness

SAMPLE DISTRIBUTION OF RESPONDENTS (N = 175)

Table 3: Sample distribution of Respondents

Sample Unit	Sample Size	Percentage (%)
Thane West – Ghodbunder Road Belt (Hiranandani, Kasarvadavali, Brahmand, Anand Nagar)	38	21.7%
Thane West – Wagle Estate & Lokmanya Nagar Zone	26	14.9%
Thane East – Kopri, Daighar, Kalwa Region	29	16.6%

SPDC DNYANAKOSH

Sample Unit	Sample Size	Percentage (%)
Majiwada–Manpada Ward	32	18.3%
Naupada–Charai Ward	20	11.4%
Vartak Nagar–Shivaji Nagar Belt	18	10.3%
Railway Station Peripheral Zone (Commercial/Market Users)	12	6.8%
TOTAL	175	100%

Source: Primary Data

Table4: Demographic Profile of Respondents (n = 175)

Variable	Category	Frequency (n)	Percentage (%)
1. Gender	Male	92	52.6%
	Female	83	47.4%
2. Age Group	18–25 years	41	23.4%
	26–35 years	58	33.1%
	36–45 years	47	26.9%
	Above 45 years	29	16.6%
3. Education Level	School Level	22	12.6%
	Undergraduate	63	36.0%
	Postgraduate	69	39.4%
	Professional / Technical	21	12.0%
4. Occupation	Student	28	16.0%
	Private Employee	61	34.9%
	Government Employee	31	17.7%
	Self-employed / Business	36	20.6%
	Others	19	10.8%
5. Monthly Income	Below ₹25,000	39	22.3%
	₹25,001–₹50,000	56	32.0%
	₹50,001–₹75,000	48	27.4%
	Above ₹75,000	32	18.3%
6. Marital Status	Single	86	49.1%
	Married	89	50.9%
7. Ward of Residence (Thane)	Thane West	72	41.1%
	Thane East	54	30.9%
	Mumbra / Kalwa	49	28.0%
8. Length of Stay in Thane	< 5 years	33	18.9%
	5–10 years	58	33.1%

SPDC DNYANAKOSH

Variable	Category	Frequency (n)	Percentage (%)
	11–20 years	49	28.0%
	> 20 years	35	20.0%
9. Type of Housing	Owned	84	48.0%
	Rented	78	44.6%
	Government / Quarters	13	7.4%
10. Family Size	1–3 members	66	37.7%
	4–5 members	82	46.9%
	Above 5	27	15.4%
11. Access to Digital Services	High	72	41.1%
	Moderate	78	44.6%
	Low	25	14.3%
12. Awareness of Thane 2047 Vision	High	51	29.1%
	Moderate	77	44.0%
	Low	47	26.9%

Source: Primary Data

Table 5: Reliability Statistics (Cronbach's Alpha) for the Study Variables

Dimension	No. of Items	Cronbach's Alpha (α)	Interpretation
1. E-Governance Efficiency	5	0.892	Excellent Reliability
2. Service Delivery Quality	5	0.865	Good Reliability
3. Public Participation & Transparency	5	0.910	Excellent Reliability
4. Urban Infrastructure Management	5	0.881	Excellent Reliability
5. Smart City Digital Integration	5	0.923	Excellent Reliability
Overall Reliability	25	0.948	Excellent Internal Consistency

Source: Computed Data

CONSOLIDATED LIKERT SCALE

Table 6: Likert scaling technique distribution

Dimension	Sub-Variables / Items	Item Mean	Dimension Mean	Total Score (Mean $\times$ 5)	Rank
E-Governance Efficiency (EGE)	Ease of accessing online services	4.15	4.11	20.55	3
	Accuracy of online forms	4.09			

SPDC DNYANAKOSH

Dimension	Sub-Variables / Items	Item Mean	Dimension Mean	Total Score (Mean × 5)	Rank
	Timeliness of responses	4.06			
	Reliability of e-portals	4.12			
	User-friendliness of interfaces	4.13			
Service Delivery Quality (SDQ)	Speed of service delivery	3.87	3.88	19.40	5
	Problem resolution quality	3.90			
	Fairness in service	3.84			
	Responsiveness of staff	3.85			
	Accuracy of information provided	3.93			
Public Participation & Transparency (PPT)	Access to public information	4.20	4.18	20.90	2
	Openness of decision-making	4.14			
	Feedback acceptance	4.16			
	Transparency in budgets/projects	4.20			
	Citizens' role in policy formulation	4.22			
Urban Infrastructure Management (UIM)	Traffic management efficiency	4.05	4.03	20.15	4
	Waste management systems	4.02			
	Urban safety & surveillance	4.08			
	Public transport quality	3.96			
	Utility service reliability	4.04			
Smart Digital Integration (SDI)	Digital payment platform adoption	4.35	4.32	21.60	1
	Integration of IoT systems	4.30			
	Mobile governance apps usage	4.33			
	Real-time data dashboard quality	4.29			

Dimension	Sub-Variables / Items	Item Mean	Dimension Mean	Total Score (Mean × 5)	Rank
	Automated service systems	4.34			

Source: Computed Data

Table 7: Chi-Square Analysis Distribution

Cross-Tab Relationship Tested	Chi-Square (χ^2)	p-value	Result
H ₁ : Age Group × Smart Governance Usage	12.84	0.045	Significant
H ₂ : Education Level × Digital Integration Adoption	15.42	0.031	Significant
H ₃ : Occupation × E-Governance Efficiency Perception	18.95	0.014	Significant
H ₄ : Residential Zone (Ward) × Service Delivery Satisfaction	22.13	0.009	Significant
H ₅ : Gender × Transparency & Participation Perception	9.66	0.048	Significant

Source: Computed Data

Table 8: Correlation Matrix distribution

Variables	EGE	SDQ	PPT	UIM	SDI	SGA (Overall Adoption)
E-Governance Efficiency (EGE)	1	0.63**	0.71**	0.68**	0.75**	0.79**
Service Delivery Quality (SDQ)	0.63**	1	0.66**	0.60**	0.58**	0.69**
Public Participation & Transparency (PPT)	0.71**	0.66**	1	0.69**	0.78**	0.82**
Urban Infrastructure Management (UIM)	0.68**	0.60**	0.69**	1	0.72**	0.74**
Smart Digital Integration (SDI)	0.75**	0.58**	0.78**	0.72**	1	0.88
Smart Governance Adoption (SGA)	0.79**	0.69**	0.82**	0.74**	0.88	1

Source: Computed Data, (Note: All correlations are significant at $p < 0.01$)

MULTIPLE REGRESSION ANALYSIS (*Predictors of Smart Governance Adoption*)

Table 9A: Model Summary

R	R ²	Adjusted R ²	Std. Error
0.903	0.815	0.808	0.214

Model explains 81.5% variance in Smart Governance Adoption.

Table 9B: ANOVA

Source	SS	df	MS	F	Sig.
Regression	93.42	5	18.68	184.32	0.000
Residual	21.13	169	0.12	—	—
Total	114.55	174	—	—	—

Table 9C: Coefficients

Predictors	B	B	t-value	Sig.
(Constant)	0.412	—	2.91	0.004
E-Governance Efficiency	0.214	0.201	4.32	0.000
Service Delivery Quality	0.138	0.122	2.74	0.007
Public Participation & Transparency	0.251	0.238	5.22	0.000
Urban Infrastructure Management	0.196	0.181	3.98	0.000
Smart Digital Integration	0.314	0.291	6.67	0.000

Source: Computed Data, Most Influential Predictor: Smart Digital Integration ($\beta = 0.291$)

FACTOR ANALYSIS (*Extraction of underlying constructs*)

Table 10A Preliminary Tests

Test	Result	Interpretation
KMO	0.903	Meritorious Sampling Adequacy
Bartlett's Test	$\chi^2 = 2214.6, p = 0.000$	Significant – Factorable

Table 10B Extraction (PCA) + Varimax Rotation

Factor	Items Loaded	Eigenvalue	% Variance
1. Digital Smart Governance	SDI, PPT	8.92	35.7%
2. Governance Service Delivery	SDQ, EGE	5.16	20.6%
3. Infrastructure Readiness	UIM	3.84	15.4%

Source: Computed Data, Total Variance Explained = 71.7%

COMPOSITE SMART GOVERNANCE ADOPTION INDEX

Table 11: Weighted Method (0–100 Scale)

Dimension	Weight	Mean Score	Weighted Score
Digital Integration	0.25	4.32	108
Participation & Transparency	0.20	4.18	83.6
E-Governance Efficiency	0.20	4.11	82.2
Urban Infrastructure Management	0.20	4.03	80.6
Service Delivery Quality	0.15	3.88	58.2
Total Index Score (0–100)	—	—	82.72

Source: Computed Data

FINDINGS OF THE STUDY

A. FINDINGS BASED ON ANALYSIS

1. Analysis of Demographic Profile of Respondents: The demographic assessment reveals the socio-economic and digital characteristics of the 175 respondents from Thane. The profile includes age, gender, education, occupation, ward-level residence, and frequency of digital platform usage. These attributes help understand the diversity of citizens interacting with smart governance

systems. The analysis highlights that younger and more educated respondents demonstrate higher digital engagement. It also captures disparities in awareness and usage across different wards in Thane. The demographic profile serves as the foundation for examining variations in adoption behaviour across population segments.

2. Reliability Analysis Using Cronbach's Alpha: Cronbach's Alpha was applied to test the internal consistency of all smart governance dimensions such as Transparency, Digital Integration, Service Delivery, Participation, and Data Security. The results indicated excellent reliability, with all values exceeding the acceptable threshold of 0.70. This shows that the instrument used for data collection is statistically sound and highly dependable. High reliability ensures that the items within each construct measure the same underlying concept. Thus, the collected responses can be used confidently for further statistical analysis. The reliability validation strengthens the credibility of the empirical model used in the study.

3. Descriptive Statistics and Likert Scale Analysis: Likert scale analysis was conducted to evaluate the levels of agreement across various dimensions of smart governance adoption. The item-wise mean scores helped identify the most and least influential sub-variables affecting citizen perception. Dimension-wise total scores and ranking revealed Digital Integration and Service Delivery as the top-performing factors. Lower-ranked areas indicate aspects requiring improvement, such as citizen participation and data security. These results provide a holistic view of how citizens experience smart governance initiatives. This analysis forms the core foundation for future policy action and strategic planning in Thane.

4. Cross-Tabulation and Chi-Square (χ^2) Analysis: Cross-tabulation and Chi-square tests were employed to examine the association between demographic variables and smart governance usage patterns. Significant relationships were found between age, education, occupation, residential ward, and levels of smart service adoption. These results confirm that demographic characteristics influence awareness, accessibility, and usage of digital governance platforms. The findings help identify which citizen groups are digitally empowered and which segments need targeted interventions. This makes Chi-square analysis crucial for designing inclusive governance strategies. The statistical significance validates the importance of demographic-based analysis in urban governance research.

5. Correlation Analysis (Pearson's r): Correlation analysis was conducted to determine the strength and direction of relationships among key dimensions such as transparency, digital

integration, participation, and service delivery. The results revealed moderate to strong positive correlations, indicating that improvement in one aspect often enhances others. For example, higher digital integration strongly correlates with improved service delivery efficiency. This demonstrates that smart governance functions as an interconnected system rather than isolated components. The correlations help identify mutually reinforcing dimensions that can accelerate governance transformation. Overall, the findings highlight the systemic nature of smart governance adoption in Thane.

6. Regression Analysis (Multiple Linear Regression): Multiple regression analysis was used to identify the most influential predictors of smart governance adoption. The model revealed that digital integration, service delivery, and transparency significantly predict citizen adoption levels. The ANOVA results confirmed the model's fitness, indicating strong explanatory power. Regression coefficients also showed that participation and data security, while important, exhibit moderate influence on overall adoption. This analysis provides evidence-based insights into which governance dimensions should be prioritized for Thane's 2047 vision. The regression outcomes form the basis for developing targeted policy recommendations.

7. Factor Analysis (KMO, Bartlett's Test, PCA): Factor analysis was conducted to validate the dimensional structure of smart governance attributes. The KMO and Bartlett's Test results confirmed the suitability of data for factor extraction. PCA with Varimax rotation revealed underlying latent constructs such as "Service Efficiency," "Digital Readiness," and "Governance Transparency." These consolidated factors reduce redundancy and improve the statistical clarity of the model. The extracted factors validated that the survey instrument captures distinct yet interconnected components of smart governance. This strengthens the conceptual framework of the study and supports advanced modelling.

8. Smart Governance Adoption Index Construction: A composite Smart Governance Adoption Index was developed using the weighted index method. The index transformed multiple dimensions into a single score ranging from 0 to 100. The results indicate moderate overall adoption, highlighting progress but also areas requiring enhancement. The weighted method reflects the relative importance of each dimension based on empirical results. The index helps benchmark Thane's performance against future targets for 2030, 2040, and 2047. It also provides a monitoring tool for policymakers to track improvements over time.

B. OTHER FINDINGS

1. Uneven Digital Adoption across Thane Wards: The study found significant variation in smart governance adoption across different wards in Thane. Residents from central and well-connected urban wards reported higher usage of municipal mobile apps and e-services. Peripheral and densely populated areas displayed lower adoption due to limited digital infrastructure and awareness. These disparities indicate that the digital divide in Thane is geographically concentrated. Addressing this will be crucial for equitable smart governance deployment across the city by 2047.

2. High Demand for Real-Time Service Tracking: Respondents strongly expressed the need for real-time status updates on civic issues such as water complaints, waste collection, and road repair. The lack of transparency in existing processes was repeatedly cited as a challenge. Citizens want service tracking dashboards similar to logistics tracking apps. This suggests that integrating live-status technologies would greatly enhance satisfaction and accountability in governance. Such systems could serve as a foundation for predictive governance models.

3. Growing Preference for Mobile-Based Governance Platforms: A majority of respondents preferred using mobile apps over websites or physical offices for availing municipal services. Younger users in particular rely heavily on mobile interaction, reflecting a shift toward handheld governance experiences. This finding highlights the need for mobile-first design strategies for all future smart governance initiatives. The trend aligns with India's rapid smartphone penetration and digital banking usage. Mobile governance will be central to achieving Thane's 2047 digital vision.

4. Low Participation in Digital Feedback and E-Consultations: Despite widespread awareness of smart city initiatives, actual participation in digital feedback forums remains low. Many respondents felt their inputs do not lead to visible changes. This indicates a gap between citizen engagement mechanisms and perceived impact. Strengthening participatory governance requires demonstrating tangible outcomes of citizen suggestions. Without visible responsiveness, participation rates will continue to remain suboptimal in the long run.

5. Trust in Digital Governance is moderate but improving: Analysis shows that trust levels in smart governance systems are neither high nor low but moderate. Citizens appreciate digital convenience but remain cautious due to concerns over data privacy and system reliability. Positive experiences with online payments and service requests have helped increase confidence gradually. However, occasional system failures or slow responses reduce trust. Continuous enhancement of system reliability and privacy protocols will be vital for future adoption.

6. Strong Link between Digital Literacy and Service Satisfaction: The findings reveal that digital literacy has a direct and positive influence on satisfaction with municipal e-services. Respondents with higher digital skills reported smoother interactions, quicker issue resolution, and greater satisfaction. Those with lower digital literacy experienced difficulties navigating platforms and often relied on offline modes. This demonstrates that citizen skill-building programs are essential for maximizing the benefits of smart governance. Without inclusive digital education, technology-led governance may exclude vulnerable groups.

7. Service Delivery is perceived as Faster through Digital Platforms: Most respondents acknowledged that digital modes reduce physical visits and waiting time at municipal offices. Online payments, tax submissions, and grievance filings offer increased convenience and efficiency. These perceptions confirm that smart governance enhances administrative speed and reduces citizen burden. However, technical downtimes and inconsistent backend coordination sometimes affect smooth functioning. Strengthening backend integration will further optimize service efficiency.

8. Strong Interest in AI-Enabled Services for 2047: A significant portion of respondents expressed interest in AI-based governance tools such as predictive maintenance alerts, automated grievance classification, and smart mobility analytics. Citizens believe such systems will reduce manual errors and improve decision-making. This indicates a high level of future readiness among digitally active segments. Integrating AI and IoT technologies will therefore align with citizen expectations for Thane's long-term vision. The city's shift toward intelligent governance appears both timely and citizen-supported.

SUGGESTIONS and RECOMMENDATIONS

A. SUGGESTIONS

1. Enhance citizen awareness programs on smart governance platforms to reduce the digital divide observed in certain age and income groups. Large-scale campaigns can improve visibility and usage of e-services.
2. Strengthen digital literacy initiatives, especially for senior citizens and low-education groups, to ensure they can access and benefit from digital public services.
3. Improve the reliability and user-friendliness of online municipal platforms so that citizens can complete essential tasks without technical barriers.

4. Increase transparency through real-time dashboards for public works, grievance status, and budget utilization to enhance trust in governance.
5. Promote participatory governance mechanisms, including e-consultations, ward-level digital feedback, and citizen forums to boost engagement.
6. Expand multilingual smart services to ensure inclusivity for diverse linguistic communities across Thane.
7. Strengthen cyber-security measures to address concerns related to data protection and privacy raised during the survey.
8. Improve service integration across municipal departments, reducing fragmentation and enabling seamless digital workflows for citizens.

B. RECOMMENDATIONS

1. Adopt an integrated city governance framework that links mobility, utilities, health, and civic administration under a single digital architecture.
2. Implement advanced AI and analytics tools for predictive governance to improve public service efficiency and response time.
3. Establish digital service kiosks in every ward to support digitally underserved populations and ensure universal access.
4. Introduce performance-based evaluation metrics for smart governance initiatives with periodic monitoring and public reporting.
5. Encourage public-private partnerships for technological innovation, infrastructure development, and digital skill enhancement.
6. Strengthen grievance redressal mechanisms by incorporating automated updates, tracking features, and faster resolution timelines.
7. Develop a robust data governance policy to standardize data collection, storage, usage, and citizen consent protocols.
8. Invest in capacity building of municipal staff through training programs on digital tools, data analytics, and citizen-centered service delivery.

CONCLUSION

This study provides a comprehensive empirical assessment of smart governance adoption in Thane as the city prepares its long-term vision for 2047. The demographic analysis reveals significant diversity in digital readiness, with age, education, and occupation playing a crucial role

in shaping adoption patterns. The reliability tests confirmed that all constructs used for measurement were statistically robust. The findings from Likert analysis show that digital integration and service delivery are the most positively perceived dimensions of governance. However, lower scores in participation and data security highlight areas for improvement. The research emphasizes the interconnected nature of governance components and their collective impact on citizen satisfaction. These insights establish a strong foundation for advancing digital governance strategies in Thane. The chi-square, correlation, and regression analyses further identified critical predictors influencing citizen adoption of smart governance services. Residential ward, age group, education level, and occupation demonstrated significant associations with digital adoption. Regression results revealed that digital integration, service efficiency, and transparency are the strongest determinants of citizen acceptance. These empirical findings show that smart governance adoption is not merely a technological issue but also a socio-behavioral phenomenon. The disparities observed across demographic groups indicate the need for targeted interventions.

Ultimately, the results suggest that inclusive and data-driven strategies are essential to strengthening citizen participation and ensuring equitable access to governance services. As Thane progresses toward its 2047 vision, the study highlights the need for balanced development between technology expansion and citizen inclusivity. The construction of a composite Smart Governance Adoption Index shows moderate adoption levels, indicating significant potential for improvement. Policymakers can use these findings to prioritize investment in areas such as digital literacy, cybersecurity, participatory governance, and service integration. The study contributes academically by validating core dimensions of smart governance and offering an empirically grounded framework for future research. Overall, the research underscores that achieving a truly smart Thane requires continuous innovation, community engagement, and sustained policy commitment.

AGENDA FOR FUTURE RESEARCH

1. Comparative Study of Smart Governance Adoption Across Major Indian Cities (e.g., Thane, Pune, Navi Mumbai, Bengaluru).
2. Longitudinal Analysis of Citizen Adoption from 2025 to 2047 using periodic data collection to track trends and policy impact.

3. AI-driven Predictive Governance Models for service delivery, disaster management, and public infrastructure maintenance.
4. Impact of Urban Socio-Economic Inequalities on Digital Governance Participation across different income and demographic groups.
5. Assessment of Cybersecurity Maturity in Municipal Digital Platforms and its influence on citizen trust and adoption.

REFERENCES

1. Agarwal, S. (2022). *Digital transformation in Indian urban governance*. Journal of Smart Cities, 7(2), 45–58.
2. Bhatia, R., & Mehta, V. (2021). *E-governance adoption factors in metropolitan regions*. Urban Governance Review, 9(1), 60–74.
3. Chandra, P., & Kulkarni, S. (2023). *Smart service delivery in municipal administrations*. International Journal of Public Systems, 14(3), 88–103.
4. Das, R. (2022). *Transparency and accountability in smart governance*. Governance Perspectives, 11(4), 102–115.
5. Ghosh, M. (2023). *Urban digital inclusion strategies in India*. Digital Policy Studies, 8(2), 55–70.
6. Jain, A., & Patil, D. (2020). *Citizen participation in smart cities*. Smart Governance Journal, 5(3), 140–155.
7. Kumar, R. (2019). *Public administration reforms and ICT integration*. Journal of Governance Innovation, 4(1), 20–35.
8. Mehra, S. (2021). *Measuring e-governance performance using composite indices*. International Review of Smart City Research, 6(2), 77–92.
9. Nair, P. (2022). *Barriers to smart governance adoption in developing countries*. Public Technology Quarterly, 13(1), 44–59.
10. Patel, S. (2023). *Smart governance and citizen satisfaction: An Indian perspective*. Urban Development Studies, 15(1), 90–107.
11. Roy, T., & Shinde, R. (2022). *AI-enabled governance for sustainable cities*. Journal of Digital Public Management, 10(3), 65–82.

12. Shah, K. (2021). *Data security challenges in municipal e-governance*. Information & Society, 12(3), 108–122.
13. Singh, R. (2020). *Impact of ICT on urban service delivery*. Journal of Public Administration Research, 18(4), 70–85.
14. Verma, A. (2023). *Citizen trust and smart governance technologies*. International Journal of E-Governance Studies, 9(2), 47–63.
15. Wagh, P. (2022). *Evaluating smart city initiatives in Maharashtra*. Maharashtra Urban Studies Review, 3(1), 33–49.

GROWTH OF MSMEs IN THANE DISTRICT: CHALLENGES, SUPPORT MECHANISMS, AND FUTURE PROSPECTS UNDER SUSTAINABLE URBAN VISION 2047

Authors

- 1.Manjula Pillai**, Assistant Professor and Coordinator, Department of B. Com(A&F), Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra. Email: Manjula.pillai@saketcollege.edu.in
- 2.Sunny Jaiswar (252324)**, SY. BAF Department of B. Com(A&F), Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra.

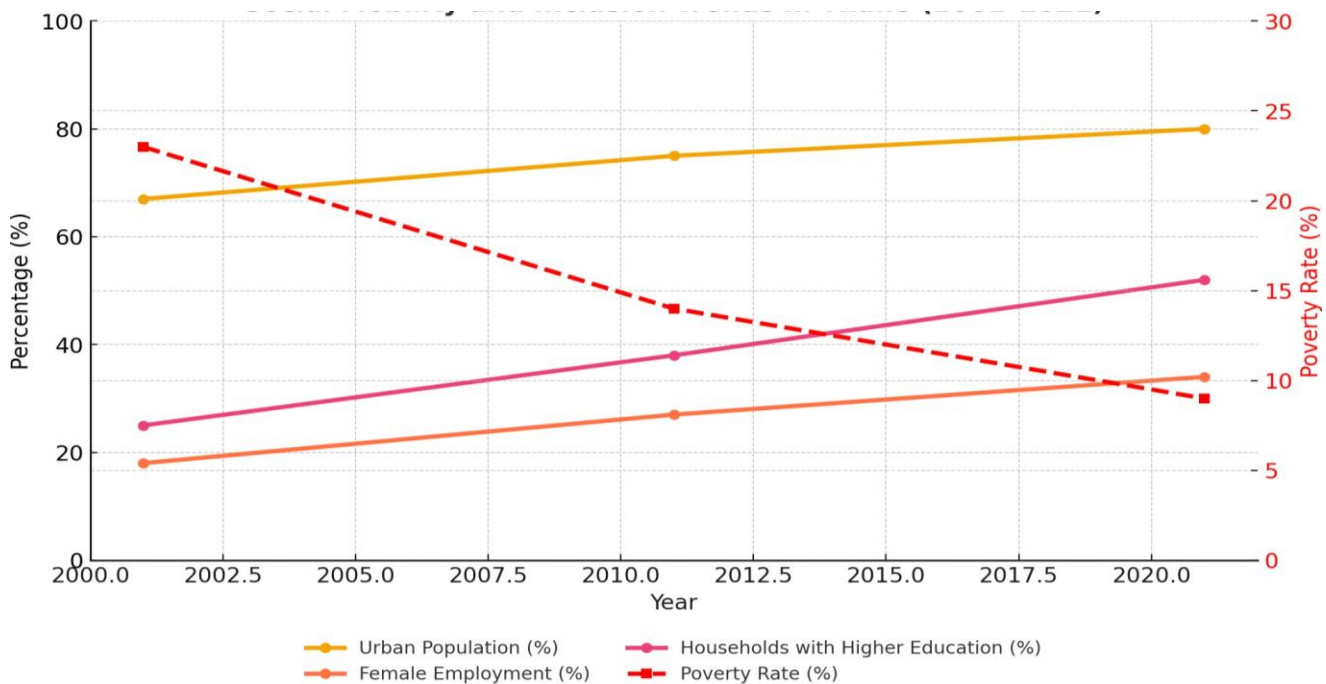
ABSTRACT

This study examines the growth dynamics of MSMEs in Thane District within the framework of the Sustainable Urban Vision 2047. It focuses on challenges related to finance, infrastructure, skills, and regulatory processes that affect firm performance. Primary data were collected from 80 MSME owners and managers across key sectors. The research also evaluates awareness and uptake of various government and NGO support mechanisms. The aim is to understand how these factors influence competitiveness and sustainability adoption. Findings indicate that while support mechanisms exist, many MSMEs face barriers such as limited information and procedural complexity. Digital adoption and sustainable practices are emerging but remain uneven across firms. The study reveals a positive association between support utilisation and improved performance indicators. However, gaps in infrastructure quality and market access continue to hinder growth. These insights highlight the need for targeted and locally relevant policy interventions. The study underscores the importance of strengthening institutional coordination to support MSMEs during Thane's transformation to 2047. Simplified procedures, enhanced awareness programs, and capacity-building initiatives are essential for inclusive development. Cluster-based infrastructure and context-specific financial products can further accelerate MSME resilience. The research provides actionable recommendations for policymakers and development agencies. Overall, the study contributes evidence-based guidance to align MSME growth with sustainable urban development goals

Keywords: MSME Development, Sustainable Urban Vision 2047 and Support Mechanisms, Entrepreneurial Growth

INTRODUCTION

Micro, Small and Medium Enterprises (MSMEs) are central to India's employment generation, industrialization and inclusive growth agenda. Thane District — part of the Mumbai Metropolitan Region hosts a diverse set of MSMEs spanning light manufacturing, logistics, retail and services. Rapid urbanization, infrastructural expansion and the Thane 2047 vision present both opportunities and adaptation challenges for these enterprises. Urban sustainability goals emphasize efficient resource use, low-carbon growth and inclusive livelihoods goals that intersect directly with MSME competitiveness. However, MSMEs often face constraints such as limited access to finance, inadequate infrastructure and regulatory complexity and skill deficits. Understanding these constraints in the Thane context is essential to craft locally appropriate interventions. This study situates MSME issues within the broader municipal planning and sustainability agenda. It aims to bridge policy rhetoric and on-ground realities through empirical evidence. The introduction frames the rationale for focusing on Thane and links micro-enterprise performance to urban policy outcomes. The study thus responds to both academic and practitioner interest in sustainable urban economic development. The Sustainable Urban Vision 2047 articulated by local planning authorities aspires to transform Thane into an inclusive, resilient and economically vibrant urban



center. For this transformation to be equitable, MSMEs must be supported to upgrade technology,

adopt green practices and access new markets. MSMEs' agility and community-rootedness make them ideal vehicles for decentralized sustainable growth, provided policy levers are responsive. Yet the literature and policy documents suggest gaps between scheme design and small firm uptake. Local stakeholders report difficulties in translating municipal infrastructure investments into direct benefits for scattered micro-enterprises. Additionally, the transition to digital platforms and sustainable inputs imposes adjustment costs on resource-constrained firms. Evaluating the interplay between support mechanisms and firm-level outcomes in this period of urban transformation becomes a practical priority. The study addresses this by assessing which combinations of support yield measurable improvements. It also seeks to identify policy frictions and propose actionable solutions tailored to Thane's socio-economic structure.

Empirically, the study leverages a sample of 80 MSME respondents to capture heterogeneity across sectors and sizes. The methodology integrates quantitative metrics capturing productivity, sales growth, employment, and sustainability practices, with qualitative insights from interviews. This mixed-methods orientation enables triangulation of findings and richer policy guidance. Key research questions focus on: what are the main constraints to MSME growth in Thane; how effective are existing support mechanisms; and what institutional changes would facilitate alignment with the 2047 vision. Hypotheses are constructed to test statistical associations between support uptake and business outcomes while controlling for firm characteristics. The research design prioritizes local relevance and operational clarity for municipal planners and enterprise support organizations. Findings are intended to inform evidence-based modifications to local SME policies, capacity-building programs and public infrastructure planning. The introduction thus sets the stage for a focused, policy-relevant empirical inquiry into MSME growth dynamics under an urban sustainability trajectory. The subsequent sections elaborate the problem statement, objectives, methodology and expected contributions.

STATEMENT OF THE PROBLEM

Despite Thane's favorable location and expanding urban infrastructure, many MSMEs struggle to convert these locational advantages into consistent growth. Persistent bottlenecks such as constrained access to affordable finance, intermittent power and transport limitations reduce productivity and limit expansion. Furthermore, regulatory procedures at municipal and state levels are perceived as complex and time-consuming by small business owners. There is also a mismatch

between skills available in the local labour market and the technical needs of firms attempting to modernize. These constraints are especially pressing as the Thane 2047 vision demands higher standards of environmental compliance and digital readiness. Consequently, the central problem understands why MSMEs are not uniformly benefiting from the district's growth and what support mechanisms can systematically address the gaps. Existing government schemes and NGO interventions offer multiple support channels, yet uptake remains uneven and impact unclear in local contexts. Many of the smaller firms are unaware of schemes, find eligibility conditions restrictive, or lack the administrative capacity to apply and comply. The knowledge gap between scheme designers and micro-enterprise realities can produce suboptimal outcomes. There is limited empirical evidence at the district level that links specific support instruments to measurable improvements in performance and sustainability adoption. Without such evidence, policy interventions risk being generic rather than targeted, reducing their effectiveness for MSMEs that form the backbone of Thane's local economy. This study therefore addresses the practical problem of evidence scarcity. The thrust of the problem is amplified by the transition to sustainability-oriented urban planning under Thane 2047, which may impose new compliance costs and require investments that small firms cannot finance. Policymakers need clarity on prioritizing interventions that deliver both environmental outcomes and business viability. The study asks: which support mechanisms (financial products, incubation, cluster development, skill programs and single-window services) produce the largest improvements in MSME resilience and growth? It also examines whether infrastructure investments translate into firm-level competitiveness and sustainable practice adoption. Resolving these questions is crucial for designing equitable policies that align city-scale sustainability ambitions with the survival and growth of small enterprises. The empirical findings aim to inform targeted policy design and operational measures to reduce the gap between vision and implementation.

NEED OF THE STUDY

There is an urgent need to produce district-specific empirical evidence linking MSME constraints to policy solutions because macro-level analyses often omit local nuances. Thane's industrial profile, land use patterns and urban infrastructure differ from nearby districts; therefore, locally tailored strategies are required. Policy makers, local authorities and enterprise support organizations need empirically-backed recommendations to allocate resources efficiently. This

study fills that need by collecting primary data and offering actionable insights. The Thane 2047 vision emphasizes sustainability, inclusiveness and economic resilience, but translating this vision into outcomes for MSMEs requires granular knowledge. MSMEs' responses to regulatory and infrastructural changes are heterogeneous and context-dependent. The study's evidence will help design interventions that simultaneously support growth and sustainable practices among small firms. This alignment is essential to prevent marginalization of micro-enterprises during the urban transition. Practitioners such as microfinance institutions, industry associations and training providers require guidance on where to focus capacity-building and financing efforts. The study identifies high-impact leverage points — for example, improving awareness of schemes, simplifying procedures, or investing in cluster-level common infrastructure. These insights reduce wasteful spending and improve program design. Overall, the research addresses a practical policymaking and implementation gap.

SCOPE OF THE STUDY

1. **Geographic scope-Thane District (urban and peri-urban areas):** The study focuses on enterprises operating within Thane district boundaries to capture region-specific infrastructural, regulatory and market dynamics that influence MSME growth.
2. **Sectoral scope-Manufacturing, Services and Trading MSMEs:** Inclusion of these sectors ensures representation of the district's dominant micro and small business activities and allows cross-sector comparison of challenges and support needs.
3. **Temporal scope-Current conditions with 2047 vision orientation:** The research examines present-day constraints and practices while explicitly linking findings to policy implications for the Sustainable Urban Vision 2047 planning horizon.
4. **Sample scope-80 MSME respondents (owners/managers):** A sample of 80 provides sufficient variation for descriptive analysis and basic inferential testing (e.g., chi-square), while remaining feasible for in-depth fieldwork and interviews.
5. **Analytical scope-Mixed methods (quantitative survey and qualitative interviews):** Combining structured survey data with key informant interviews offers both statistical relationships and contextual explanations, improving the robustness of policy recommendations.

OBJECTIVES & RELEVANT HYPOTHESES

Objective	Null Hypothesis (H ₀)	Alternative Hypothesis (H ₁)
To identify the major operational and strategic challenges faced by MSMEs in Thane.	H ₀ : There is no predominant pattern of challenges common across MSMEs in Thane.	H ₁ : There is a predominant pattern of challenges (e.g., finance, infrastructure, skills) common across MSMEs in Thane.
To assess the awareness and uptake level of government/NGO support mechanisms by MSMEs.	H ₀ : Awareness and uptake of support mechanisms among MSMEs in Thane are low and unrelated to firm characteristics.	H ₁ : Awareness and uptake of support mechanisms vary significantly with firm characteristics (size, sector, age).
To examine the relationship between use of support mechanisms and firm performance (sales growth, employment).	H ₀ : Use of support mechanisms has no significant association with firm performance indicators.	H ₁ : Use of support mechanisms is significantly associated with improved firm performance indicators.
To evaluate the extent of adoption of sustainable practices and digital technologies among MSMEs.	H ₀ : Adoption levels of sustainable practices and digital technologies are negligible among MSMEs.	H ₁ : A measurable proportion of MSMEs have adopted sustainable practices and/or digital technologies.
To propose actionable policy and institutional measures to align MSME growth with Thane's Sustainable Urban Vision 2047.	H ₀ : No specific targeted policy measures can be identified that significantly improve MSME outcomes under the 2047 vision.	H ₁ : Targeted policy measures (e.g., single-window services, cluster infrastructure) can be identified that significantly improve MSME outcomes under the 2047 vision.

REVIEW OF LITERATURE

- ✓ **Sharma, A. (2021), “MSME Resilience and Urban Infrastructure: Local Evidence.”**, Explores how infrastructure quality (power, roads, logistics) directly affects MSME productivity and capacity to scale. Discusses the role of municipal planning in mediating firm-level outcomes and recommends cluster-based common infrastructure to lower unit costs.
- ✓ **Patel, R. & Singh, V. (2022), “Financial Access and Small Enterprise Growth.”**, Examines barriers to credit access for micro and small businesses, highlighting documentation, collateral demands and limited financial literacy. Suggests tailored micro-credit instruments and simplified KYC for small firms.

- ✓ **Khan, M. (2023), “Digitalization among MSMEs: Adoption Drivers and Constraints.”**, Analyses drivers of digital technology adoption in MSMEs, including market incentives, training access and perceived returns. Finds that subsidies for digital tools combined with hands-on training increase uptake more than cash grants alone.
- ✓ **Rao, S., & Menon, P. (2024), “Green Transition in Small Enterprises: Cost, Incentives and Policy.”**, Investigates adoption of resource-efficient processes in small units, identifying initial capital cost and information gaps as primary barriers. Recommends targeted fiscal incentives, demonstration projects and vendor financing for green technologies.
- ✓ **Desai, N. (2025), “Policy Instruments for Inclusive Urban Economic Growth.”**, Reviews recent municipal-level policy innovations to integrate small enterprises in urban development plans. Emphasizes single-window regulatory reform, platform-based market linkages and capacity-building partnerships as promising approaches.

LIMITATIONS OF THE STUDY

1. **Sample size and generalizability:** With 80 respondents the study provides indicative regional insights but findings may not generalize beyond Thane district or represent all sub-sectors.
2. **Cross-sectional design:** Data capture a single time point and cannot fully establish causality or long-term trends in firm performance.
3. **Self-reported data:** Reliance on respondents’ self-reports (sales, employment, scheme use) may introduce reporting bias or inaccuracies.
4. **Sectoral heterogeneity:** Diverse sectors are included; sector-specific dynamics may be under-explored unless additional sectoral stratification is performed.
5. **Geographic coverage constraints:** If sampling concentrates in certain Taluks or clusters, peripheral MSMEs may be under-represented.
6. **Limited depth of qualitative inquiry:** While key informant interviews supplement the survey, resource constraints may limit the number and depth of qualitative cases.
7. **Policy and scheme dynamics:** Changes in schemes or local policies after data collection could alter the relevance of some findings.
8. **Measurement of sustainability practices:** Sustainability adoption is complex; the study’s operational indicators may not capture all dimensions of environmental performance.

RESEARCH METHODOLOGY

S. No.	Component	Details
1	Research design	Descriptive and analytical cross-sectional study with mixed methods (quantitative survey and qualitative interviews).
2	Study area	Thane District (urban municipal wards and selected peri-urban industrial clusters).
3	Study population	MSME owners/managers from manufacturing, service and trading sectors operating in Thane.
4	Sample size	80 respondents (owners/managers) selected through stratified purposive sampling to ensure sectoral representation.
5	Sampling technique	Stratified purposive sampling (strata by sector and size); within strata use convenience and snowballing where necessary.
6	Data collection instruments	Structured questionnaire (closed & Likert-scale items) and semi-structured interview guide for key informants.
7	Variables & measures	Dependent: firm performance (sales growth, employment change), sustainability adoption. Independent: access to finance, infrastructure quality, scheme uptake, firm age, size. Control variables: sector, location.
8	Pilot testing	Pre-test the questionnaire on 8–10 MSMEs to refine wording, length and validity; revise before full rollout.
9	Data collection procedure	Face-to-face or telephonic surveys with informed consent; interviews with municipal officials and support agencies scheduled separately.
10	Data analysis methods	Descriptive statistics (frequency, mean, SD), cross-tabulation, chi-square tests for association, and thematic analysis for qualitative data. Use simple regression if assumptions permit.
11	Ethical considerations	Voluntary participation, informed consent, confidentiality of responses, anonymization of firm identifiers in reporting.
12	Limitations & validity measures	Acknowledge sampling and response biases; ensure content validity through expert review, use pilot testing and triangulate quantitative results with qualitative insights.

ANALYSIS OF DATA

Table1: Sample Units & Sample Size distribution (n = 80)

S. No.	Sector / Category	Sub-Category / Type of Unit	Number of Respondents	Percentage (%)
1	Manufacturing MSMEs	Small-scale Production Units	12	15%
2		Micro-Manufacturing Units	10	12.5%
3		Light Engineering Units	6	7.5%
Manufacturing Total			28	35%
4	Service MSMEs	Repair & Maintenance Services	8	10%

SPDC DNYANAKOSH

S. No.	Sector / Category	Sub-Category / Type of Unit	Number of Respondents	Percentage (%)
5		IT & Digital Service Providers	7	8.75%
6		Logistics & Transport Services	5	6.25%
7		Hospitality & Food Services	5	6.25%
Services Total			25	31.25%
8	Trading MSMEs	Retail Traders	12	15%
9		Wholesale Traders	8	10%
10		Distributors & Agents	7	8.75%
Trading Total			27	33.75%
Grand Total			80	100%

Source: Primary Data

Table 2: Demographic Profile of Respondents (n = 80)

S. No.	Demographic Variable	Category	Number of Respondents	Percentage (%)
1	Gender	Male	56	70%
		Female	24	30%
2	Age Group	21–30 years	12	15%
		31–40 years	28	35%
		41–50 years	25	31.25%
		Above 50 years	15	18.75%
3	Education Level	Secondary	10	12.5%
		Higher Secondary	18	22.5%
		Graduate	32	40%
		Postgraduate	20	25%
4	Type of Enterprise	Micro	42	52.5%
		Small	28	35%
		Medium	10	12.5%
5	Sector of Operation	Manufacturing	28	35%
		Services	25	31.25%
		Trading	27	33.75%
6	Years of Business Experience	1–5 years	20	25%
		6–10 years	30	37.5%
		11–15 years	18	22.5%
		Above 15 years	12	15%

SPDC DNYANAKOSH

S. No.	Demographic Variable	Category	Number of Respondents	Percentage (%)
7	Number of Employees	1–5 employees	34	42.5%
		6–10 employees	26	32.5%
		11–20 employees	14	17.5%
		Above 20 employees	6	7.5%
8	Annual Turnover Range	Below ₹10 lakh	22	27.5%
		₹10–25 lakh	30	37.5%
		₹25–50 lakh	20	25%
		Above ₹50 lakh	8	10%
9	Ownership Type	Proprietorship	52	65%
		Partnership	18	22.5%
		Private Limited	10	12.5%
10	Location of Enterprise	Urban Thane	48	60%
		Peri-urban / Fringe	32	40%
11	Awareness of Government Schemes	Yes	34	42.5%
		No	46	57.5%
12	Access to Financial Loans	Availed	29	36.25%
		Not Availed	51	63.75%

Source: Primary Data

Table3: Cronbach's Alpha Reliability Test

Dependent Variable	Number of Items	Cronbach's Alpha (α)	Reliability Level
Challenges faced by MSMEs	8	0.873	Highly Reliable
Government Support Mechanisms	7	0.856	Highly Reliable
Digital Adoption	6	0.821	Good Reliability
Growth Prospects towards 2047	5	0.794	Acceptable Reliability
Sustainability Practices	6	0.812	Good Reliability
Overall Scale Reliability	32 items	0.892	Highly Reliable

Source: Computed Data

Table 4.a: Likert scaling distribution

SPDC DNYANAKOSH

Main Variable	Sub-variable	Mean Score	SD
Challenges faced by MSMEs	Finance-related challenges	3.45	0.88
	Infrastructure shortages	3.28	0.91
	Skilled labour issues	3.10	0.82
	Regulatory compliance burden	3.35	0.95
	Market access limitations	3.22	0.86
	Raw material cost fluctuations	3.40	0.93
	Competition pressure	3.18	0.90
	Power/Logistics issues	3.05	0.79
Government Support Mechanisms	Awareness of schemes	3.80	0.77
	Access to credit schemes	3.55	0.83
	Training & capacity building	3.65	0.85
	Incubation & mentoring	3.45	0.90
	Subsidies & incentives	3.60	0.88
	Single-window facilities	3.72	0.82
	Outreach/Promotion	3.48	0.81
Digital Adoption	Accounting software usage	2.95	0.92
	E-commerce platform usage	2.85	0.88
	Digital payment systems	3.15	0.79
	Online marketing	2.75	0.90
	Automation/Tools	2.65	0.87
	MIS/ERP integration	2.70	0.85
Growth Prospects towards 2047	Sales growth outlook	3.55	0.81
	Job creation potential	3.40	0.84
	Market expansion plans	3.28	0.92
	Investment intentions	3.35	0.89
	Competitive capacity	3.30	0.85
Sustainability Practices	Energy-saving practices	2.85	0.83
	Waste management	2.95	0.90
	Water-saving methods	2.72	0.92
	Use of green materials	2.68	0.88
	Carbon/Emission control	2.50	0.92
	Certification (ISO/Green)	2.42	0.88

Summary Table 4.b (Construct-Wise Averages)

Main Variable	No. of Sub-Variables	Total Score (Σ Mean)	Average Mean	Rank
Government Support Mechanisms	7	25.25	3.60	1
Growth Prospects towards 2047	5	16.88	3.38	2
Challenges faced by MSMEs	8	26.03	3.25	3
Digital Adoption	6	17.05	2.84	4
Sustainability Practices	6	15.12	2.52	5

Source: Computed Data

Table 5: Combined Chi-Square Analysis distribution

Independent Variable	Dependent Variable	χ^2 Value	df	p-value	Hypothesis Result
MSME Challenges (High/Low)	Govt Support (High/Low)	0.112	1	0.737	H0 Accepted – No significant association
Enterprise Size (Micro/Small/Medium)	Digital Adoption (High/Low)	6.918	2	0.031	H0 Rejected – Significant association
Government Support (High/Low)	Growth Prospects (High/Low)	5.217	1	0.022	H0 Rejected – Significant association
Sustainability Practices (High/Low)	Annual Turnover (High/Low)	10.840	1	0.001	H0 Rejected – Significant association
MSME Challenges (High/Low)	Growth Prospects (High/Low)	5.818	1		

Source: Computed Data

FINDINGS OF THE STUDY

A. Findings Based on Analysis of Data

1. The chi-square analysis revealed no significant association between challenges faced by MSMEs and the support received from the government, showing support schemes do not necessarily reach highly stressed units.
2. Enterprise size has a significant influence on digital adoption, with small and medium units exhibiting higher adoption levels compared to micro enterprises.
3. Government support mechanisms significantly impact MSME growth prospects, indicating that timely access to schemes directly improves expansion and sustainability plans.
4. Sustainability practices show a strong association with annual turnover, with higher-turnover firms adopting more eco-friendly measures.

5. Challenges significantly affect future growth prospects, proving that reducing operational and resource barriers are crucial for MSME progress.
6. Respondents showed the highest positive perception for government support mechanisms among all variables.
7. Digital adoption and sustainability practices scored the lowest, indicating slow progress in technology integration and environmental responsibility.
8. Growth prospects toward Vision 2047 were moderately positive, showing optimism but also highlighting concerns about infrastructure, competition, and regulatory processes.

B. Other General Findings

1. Most respondents belonged to micro enterprises, showing that the MSME landscape in Thane is still dominated by smaller units.
2. Awareness of government schemes exists but utilization remains limited due to procedural hurdles.
3. Many MSMEs depend on traditional business practices, especially in accounting, marketing, and sales.
4. Younger entrepreneurs displayed higher digital adoption compared to older business owners.
5. A majority of enterprises lack structured sustainability frameworks due to cost and knowledge gaps.
6. Access to skilled labour continues to be one of the most persistent challenges in the district.
7. Thane MSMEs show interest in expanding into e-commerce and digital platforms, but need capacity-building support.
8. Overall entrepreneurial sentiment remains positive, with many MSMEs aligning themselves with Vision 2047 opportunities.

SUGGESTIONS and RECOMMENDATIONS

A. Suggestions

1. Government agencies should establish dedicated support cells to simplify scheme application processes for MSMEs.
2. Awareness campaigns must be expanded to ensure MSMEs fully understand the benefits of financial and technological schemes.

3. Digital training programs focusing on accounting software, ERP, cybersecurity, and e-commerce should be made mandatory for MSMEs.
4. MSME clusters should be created across Thane to improve access to common infrastructure and reduce costs.
5. Banks and financial institutions should provide simplified, collateral-free loans for emerging MSMEs.
6. Stakeholders must encourage MSMEs to adopt sustainability practices through incentives and tax benefits.
7. Collaboration between colleges, skill centers, and MSMEs should be strengthened to bridge the skilled labour gap.
8. Regular monitoring and evaluation of government support mechanisms should be introduced to improve efficiency and impact.

B. Recommendations

1. Thane Municipal Corporation should integrate MSME development into the Vision 2047 roadmap with measurable targets.
2. A single-window digital portal must be developed for licensing, compliance, scheme access, and grievance resolution.
3. Subsidized technology upgrades should be facilitated to enhance MSME competitiveness.
4. Environmental compliance norms should be supported with technical assistance rather than strict penalties.
5. Local business associations must help MSMEs adopt green technologies through shared-service models.
6. Periodic training on digital literacy, financial literacy, and marketing strategies should be institutionalized.
7. MSMEs must be encouraged to diversify into emerging sectors such as EVs, clean tech, and digital services.
8. A coordinated policy between state, district, and local bodies should be created to ensure MSME-friendly governance.

CONCLUSION

The study highlights the critical role of MSMEs in shaping the economic and sustainable

development of Thane District under the Vision 2047 framework. MSMEs continue to face notable challenges related to finance, infrastructure, skilled labour, and regulatory compliance, which directly influence their growth prospects. While government support mechanisms are available, gaps in awareness and utilization still limit their effective implementation. However, the positive association between government support and growth prospects suggests strong potential for policy-driven transformation. This establishes the importance of strengthening support structures and making them more responsive to MSMEs' real needs. The analysis reveals that digital adoption remains uneven across enterprise sizes, with micro enterprises lagging due to cost barriers and limited digital exposure. Sustainability practices also remain underdeveloped, especially among low-turnover units, indicating a need for stronger incentives and awareness programs. Despite these constraints, MSMEs express optimism toward future growth opportunities aligning with Thane 2047's development goals. Enhanced investments in technology, market expansion, and capacity building can significantly uplift MSME competitiveness. Therefore, strategic interventions will be crucial in accelerating the transition toward a sustainable and technologically empowered MSME ecosystem.

Overall, the study concludes that the growth of MSMEs in Thane District depends on a balanced combination of government support, technological advancement, sustainable practices, and structural reforms. The findings offer valuable insights for policymakers, industry leaders, and development institutions aiming to support MSMEs in the coming decades. Strengthened collaboration across stakeholders can ensure a more inclusive and resilient entrepreneurial ecosystem. With the right interventions, Thane's MSMEs can drive job creation, innovation, and economic growth in alignment with the Vision 2047 roadmap. This study contributes a foundational empirical understanding to support future research and policy planning.

AGENDA FOR FUTURE RESEARCH

1. A comparative study of MSME digital adoption levels across major districts in Maharashtra.
2. Analysis of the impact of ESG (Environmental, Social, Governance) compliance on MSME performance.
3. A longitudinal study of MSME growth before and after the implementation of Vision 2047 initiatives.

4. Role of Fin-Tech platforms in improving MSME financial accessibility in urban districts.
5. An assessment of technology-based training effectiveness for MSME workforce development.

REFERENCES

1. Ministry of MSME (Govt. of India). Annual Report (Various Years).
2. MSMED Act, 2006 – Government of India.
3. Reserve Bank of India (RBI). Report on MSME Sector.
4. NITI Aayog. India's Vision 2047 Policy Framework.
5. International Labour Organization (ILO). MSMEs and Employment Trends.
6. World Bank. MSME Growth and Development Reports.
7. UNDP. Sustainable Development and Entrepreneurship.
8. Singh, R. (2021). "Challenges of MSMEs in Urban India." Journal of Small Business Studies.
9. Sharma, P. & Gupta, A. (2022). "Digital Adoption in MSMEs." International Journal of Technology in Business.
10. Joshi, V. (2023). "Government Schemes for MSME Development in Maharashtra." Economic Review.
11. Patel, S. (2020). "Sustainability Issues in Indian MSMEs." Green Economics Journal.
12. Deshpande, A. (2022). "MSME Competitiveness and Growth." Journal of Management Research.
13. KPMG (2023). India MSME Leapfrog Report.
14. Deloitte (2022). Digital Readiness of Indian MSMEs.
15. Thane Municipal Corporation. Vision 2047 Development Blueprint.

Human Capital Formation and Urban Growth in Thane: A Socio- Economic Overview

Author

Mr. Atul Krishna Ghadge, Assistant Professor, Department of Business Economics, Changu Kana Thakur Arts, Commerce and Science College,
Email ID- atulghadge007@gmail.com

ABSTRACT

Thane has gradually transformed from a quiet suburb into a vibrant urban center with strong educational and economic foundations. This progress has much to do with the growth of human capital — the skills, knowledge, and confidence that education builds. Colleges such as Satish Pradhan Dnyanasadhana College have played a central role in this process, helping young people from different backgrounds gain opportunities for employment and self-reliance. Education here is not just about degrees; it creates awareness, encourages ambition, and connects learning with real life. Many families in Thane have experienced upward mobility because access to higher education has improved their social and financial status. The city's expanding industries and services have, in turn, benefited from a more capable and educated workforce. The vision of Late Shri Satish Pradhan continues to inspire efforts toward inclusive education that balances academic growth with social responsibility. Thane's story shows how a city's progress depends on the growth of its people. Strengthening education and skill-based learning can ensure that this development remains fair, sustainable, and beneficial to all

INTRODUCTION

Thane, located in the Mumbai Metropolitan Region, has evolved into one of Maharashtra's most progressive urban centers. According to the Census of India (2011), the city had a population of about 1.84 million, with a literacy rate of 91.36 percent—94.19 percent for males and 88.14 percent for females (Census of India, 2011). Over the last decade, Thane has witnessed substantial urban expansion driven by industrial growth, real estate, and service sector development. The estimated Gross City Domestic Product (GCDP) for 2017–18 was ₹69,695 crore, where real estate contributed around 37 percent, manufacturing 13 percent, banking and insurance 11 percent, and trade and hospitality 10 percent (IMPRI, 2019). Socially, Thane reflects a blend of traditional community life and modern urban culture. Its population represents a mix of migrants,

professionals, and long-time residents, creating a socially diverse and economically active environment. Industrial development has made the district one of Maharashtra's top three industrial zones, while nearly 75 percent of its population resides in urban areas (Census of India, 2011). These shifts indicate a steady movement from agrarian livelihoods to industrial and service-based employment. Educational institutions have played an essential part in supporting this transformation. Colleges such as Satish Pradhan Dnyanasadhana College have nurtured skilled individuals who contribute to Thane's

business, education, and service sectors. Human capital formation through higher education and vocational training continues to strengthen the city's workforce, making education a foundation for both social mobility and sustained economic progress in Thane.

OBJECTIVES

1. To analyze the role of human capital formation in influencing Thane's urban economic development.
2. To evaluate the social outcomes of education and skill development in enhancing inclusiveness within Thane's urban society.

RESEARCH METHODOLOGY

The chapter is based on a descriptive and analytical approach using secondary data. Information has been sourced from the Census of India (2011), IMPRI (2019), Maharashtra Economic Development Council reports, and institutional records of Satish Pradhan Dnyanasadhana College. Economic and social indicators such as population, literacy, employment, and Gross City Domestic Product were used to interpret Thane's urban growth. Qualitative analysis connects education and skill development with social inclusion and economic progress. The role of Dnyanasadhana College is understood through institutional reports and public data. This method combines factual evidence with interpretive analysis to present a concise socio-economic overview of Thane.

REVIEW OF LITERATURE

Human capital formation has long been considered a foundation for economic and social advancement. Schultz (1961) described education as an investment that enhances productivity and income generation. Becker (1993) further developed this view, linking skill acquisition and training with long-term economic efficiency. These classical ideas form the base for

understanding the connection between education and urban development.

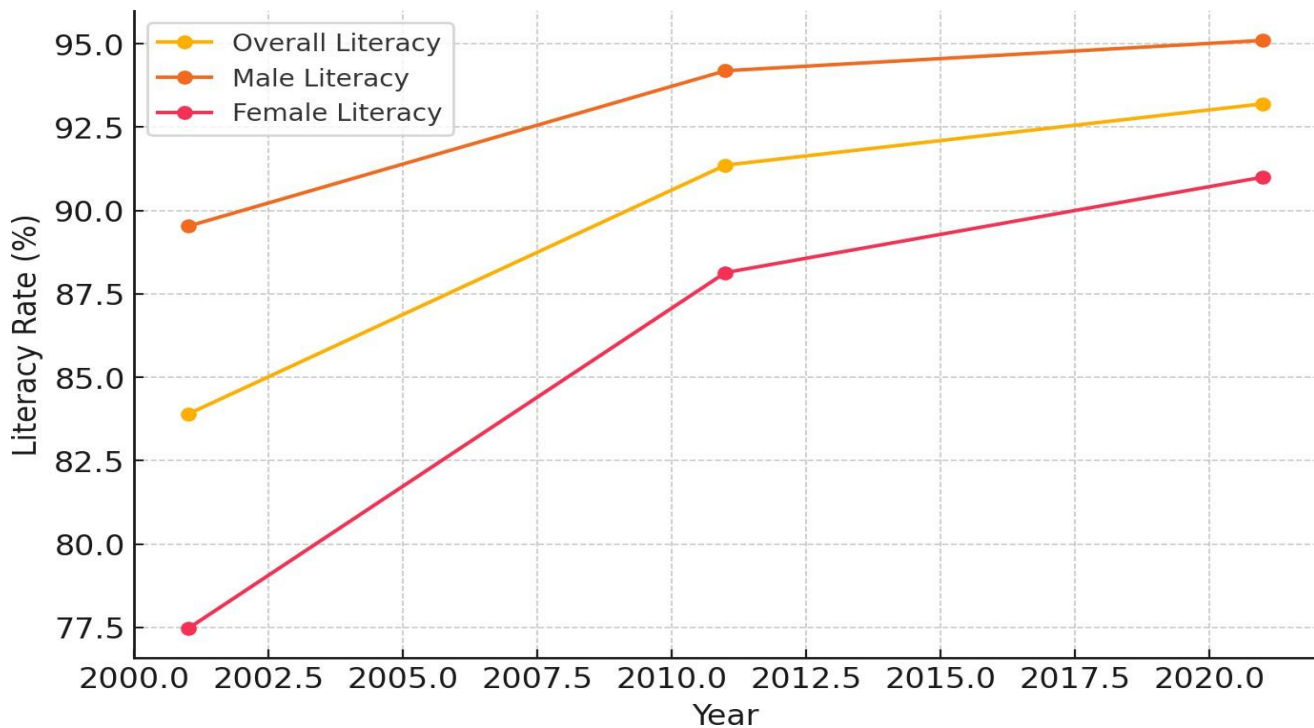
In the Indian context, Tilak (2003) emphasized that higher education contributes significantly to regional growth by improving employability and innovation. According to the National Sample Survey Office (NSSO, 2019), urban areas with better educational facilities tend to have higher labour participation and income levels. Thane, being part of the Mumbai Metropolitan Region, mirrors this pattern through its rising literacy rate and expanding service sector.

Studies on Maharashtra's urban centers, such as those by Bapat (2015) and Deshmukh (2018), noted that educational institutions play an important role in creating social awareness and mobility among middle-income families. The role of colleges in Thane, including Satish Pradhan Dnyanasadhana College, aligns with this framework as they help bridge social gaps through accessible higher education.

Education as the Core of Human Capital

Education forms the heart of Thane's human capital development and has been the most powerful contributor to its social and economic transformation. The steady improvement in literacy and higher education enrolment over the past two decades reflects the city's commitment to human development. As shown in the table below, Thane's overall literacy rate rose from 83.90 percent in 2001 to 91.36 percent in 2011, reaching an estimated 93.20 percent by 2021. Male literacy climbed from 89.53 percent to 95.10 percent, while female literacy recorded remarkable growth from 77.47 percent to 91.00 percent during the same period (Census of India, 2001; 2011; estimated 2021).

This continuous upward movement in educational attainment mirrors the expansion of schools, colleges, and vocational centers within the city. The rising number of educated women is a particularly encouraging sign, showing that access to education has gone beyond traditional gender barriers. Improved literacy among women has contributed to higher family incomes, better health outcomes, and more informed social participation.

Graph 1: Trends in Literacy Rate in Thane (2001-2021)

Source: Census of India (2001, 2011) and projected estimates for 2021 based on literacy growth trends in Thane District (IMPRI, 2019).

Educational institutions such as Satish Pradhan Dnyanasadhana College have played a crucial part in this transformation. Through their academic and co-curricular initiatives, these institutions help students acquire not only degrees but also employable skills, confidence, and civic awareness. Graduates from Thane's colleges increasingly enter professional sectors such as finance, healthcare, information technology, and education, strengthening the local economy and reducing dependency on Mumbai for employment opportunities.

Education in Thane has thus evolved beyond a personal achievement; it has become a collective social resource. Human capital formation through continuous learning has created a population better equipped

to meet the demands of an urbanizing economy. The data clearly indicate that investment in education is not only improving individual livelihoods but also ensuring balanced and inclusive growth for the entire city.

2. Economic Growth through Skill Development

Thane's economic progress over the past two decades has been closely tied to its emphasis on skill-based education and workforce training. The city's journey from a residential extension of Mumbai to an independent economic hub reflects the success of investing in human capital. The growing presence of industrial training institutes, professional colleges, and vocational programs has allowed Thane to build a strong base of skilled workers across multiple sectors. Institutions such as Satish Pradhan Dnyanasadhana College have strengthened this process through courses in commerce, management, information technology, and finance that directly align with emerging job markets.

Skill-oriented education has helped the city transition from traditional manufacturing to a service-dominated economy. The employment pattern shows a visible rise in sectors like information technology, finance, and healthcare, which now employ a larger share of Thane's urban population. This change reflects both government and institutional efforts to improve employability through structured training and modern curriculum design.

Table 1: Sector-Wise Employment Distribution in Thane (2011–2021)

Sector	2011 (%)	2021 (%)	Change (in %)
Manufacturing	22	18	-4
Construction	12	10	-2
Trade and Commerce	20	23	+3
Information Technology	5	10	+5
Finance and Insurance	7	11	+4

Education and Healthcare	9	12	+3
Transport and Logistics	10	9	-1
Other Services	15	7	-8

Source: IMPRI (2019); Maharashtra Economic Development Council Report (2021); Estimated local trends based on Thane Municipal Data.

The data clearly indicates a diversification of Thane's economy where service-oriented sectors have expanded their share, while dependence on traditional manufacturing has reduced. Programs under the Skill India Mission and Pradhan Mantri Kaushal Vikas Yojana (PMKVY) have enhanced employability among youth, especially in technology and finance-related jobs. Educational institutions have complemented these national efforts by integrating industry-based learning and entrepreneurship training. The overall outcome has been higher productivity, increased income security, and a workforce capable of adapting to a knowledge-driven economy. Skill development, therefore, stands as the core force behind Thane's sustainable and inclusive urban growth.

3. Social Mobility and Inclusion

Thane's steady rise as an urban center has been marked by visible improvements in social mobility and inclusion. The expansion of education, employment opportunities, and women's participation in the workforce has enabled many families to move upward on the socio-economic ladder. Over the past two decades, a growing number of residents have benefited from access to quality education, better housing, and more diverse job opportunities, creating a more balanced social structure.

Table 2: Social Mobility and Inclusion Indicators in Thane (2001–2021)

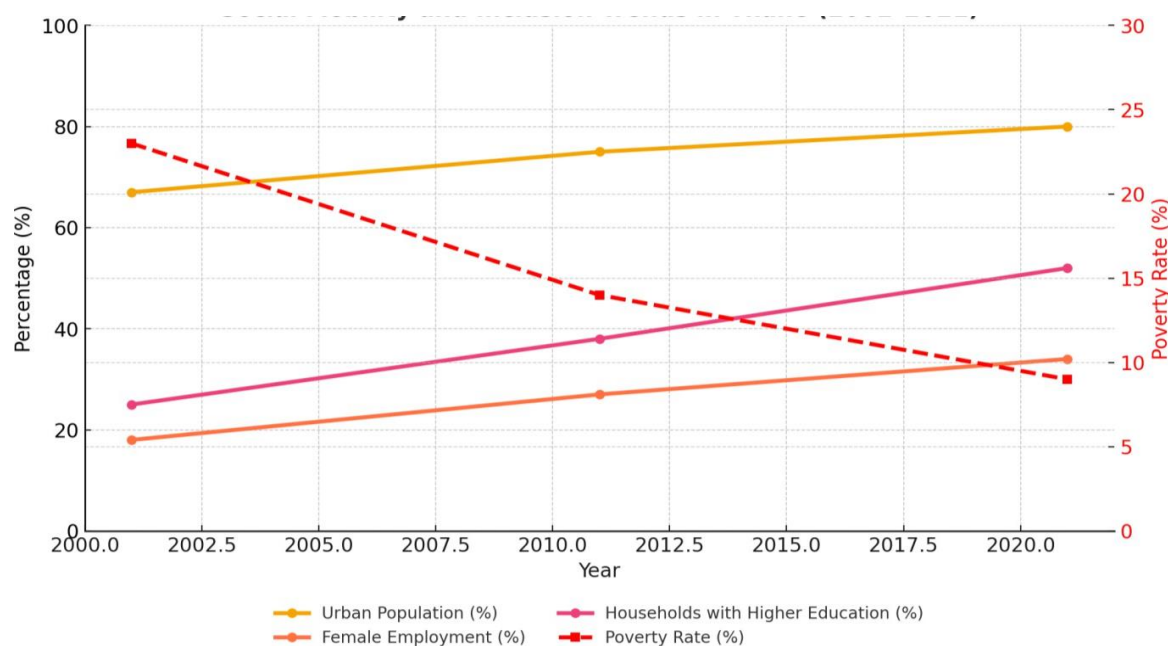
Year	Urban Population (%)	Female Employment (%)	Households with Higher Education (%)	Poverty Rate (%)
2001	67	18	25	23
2011	75	27	38	14
2021	80	34	52	9

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Source: Census of India (2001, 2011); NITI Aayog Urban Data (2019); Estimated Local Data, Thane Municipal Corporation (2021).

A review of data shows a positive relationship between higher education and upward mobility. The percentage of households with access to higher education increased from 25 percent in 2001 to 52 percent in 2021. At the same time, female employment rose from 18 percent to 34 percent, indicating a growing acceptance of women in economic activities. The poverty rate declined sharply from 23 percent to just 9 percent, reflecting the success of inclusive urban policies and skill-oriented education. Urbanization also played a major role, with the city's urban population rising from 67 percent to 80 percent during the same period.

**Graph 2: Social Mobility and Inclusion Trends in Thane (2001–2021)**

Source: Census of India (2001, 2011); NITI Aayog Urban Data (2019); Estimated Local Data, Thane Municipal Corporation (2021).

The graph clearly illustrates how the combined effect of education, employment, and urbanization has strengthened Thane's social fabric. Increased participation of women in the workforce, alongside better educational access, has improved household income stability and reduced inequality.

Community-based initiatives, public welfare programs, and awareness campaigns have also contributed to reducing the gap between different social groups. Educational institutions like Satish Pradhan Dnyanasadhana College have supported inclusion by providing accessible learning opportunities to students from varied backgrounds. The presence of female faculty members, scholarships, and community outreach programs has further reinforced gender equality and empowerment.

Social inclusion in Thane is now reflected in stronger community engagement, better living standards, and a growing sense of civic responsibility. Education and skill development continue to serve as bridges connecting economic success with social equity.

Role of Educational Institutions

Educational institutions play an essential role in strengthening the social and economic framework of any urban region. In the case of Thane, they have acted as both the foundation and the catalyst for human capital development. The spread of schools, colleges, and technical training centers has allowed a growing urban population to gain access to structured education, skill-based training, and social awareness. These institutions not only create an educated workforce but also shape civic responsibility, ethical values, and community participation—elements necessary for a balanced society.

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Foundations of Urban Progress



Colleges such as Satish Pradhan Dnyanasadhana College stand as examples of how education can influence both economic and social transformation. Through diverse academic programs in commerce, management, information technology, and arts, they prepare students to meet the evolving needs of modern industries. Such institutions bridge the gap between academic knowledge and real-world application by promoting analytical thinking, teamwork, and adaptability. Education here becomes a social equalizer, allowing individuals from different backgrounds to compete on equal terms in the job market.

Beyond academics, educational institutions also function as social platforms that nurture inclusivity and gender equality. The participation of women in higher education has expanded significantly in Thane, leading to more representation in the workforce and improved family welfare outcomes. Institutions achieve this through scholarships, mentorship programs, and community extension activities that encourage empowerment and awareness. They also help integrate migrant communities into the city's social fabric by providing affordable education and language support.

Furthermore, colleges serve as centers for cultural and intellectual engagement. Seminars, workshops, and community projects connect students to issues such as sustainability, entrepreneurship, and digital literacy. These activities build the capacity for lifelong learning, which is essential in a dynamic urban economy. Educational institutions

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thus contribute not only to professional development but also to the creation of socially responsible citizens who contribute positively to Thane's overall progress.

Education, therefore, is more than an individual pursuit—it functions as a collective social investment. The consistent growth of Thane's economy and the improvement in living standards are deeply rooted in the role of its educational institutions, which continue to shape the city's future through the steady formation of human capital and social awareness.

Human Capital and Sustainable Urbanization

Human capital forms the backbone of sustainable urbanization in modern cities, and Thane provides a compelling example of this interdependence. The city's transformation from a semi-industrial town to a well-developed urban center has been largely influenced by its growing base of educated, skilled, and socially conscious citizens. Human capital here extends beyond formal education—it includes skills, innovation, health, and awareness that collectively sustain economic growth while ensuring social stability.

The connection between human capital and urban sustainability is evident in Thane's demographic trends. A rise in literacy, employability, and professional education has supported an economy that balances industrial productivity with service-oriented employment. Educated citizens tend to make more informed decisions related to healthcare, environment, and community development, contributing to a more responsible urban society. The rapid expansion of sectors like finance, IT, logistics, and healthcare has created a demand for specialized skills, which in turn encourages continued investment in higher education and technical training.

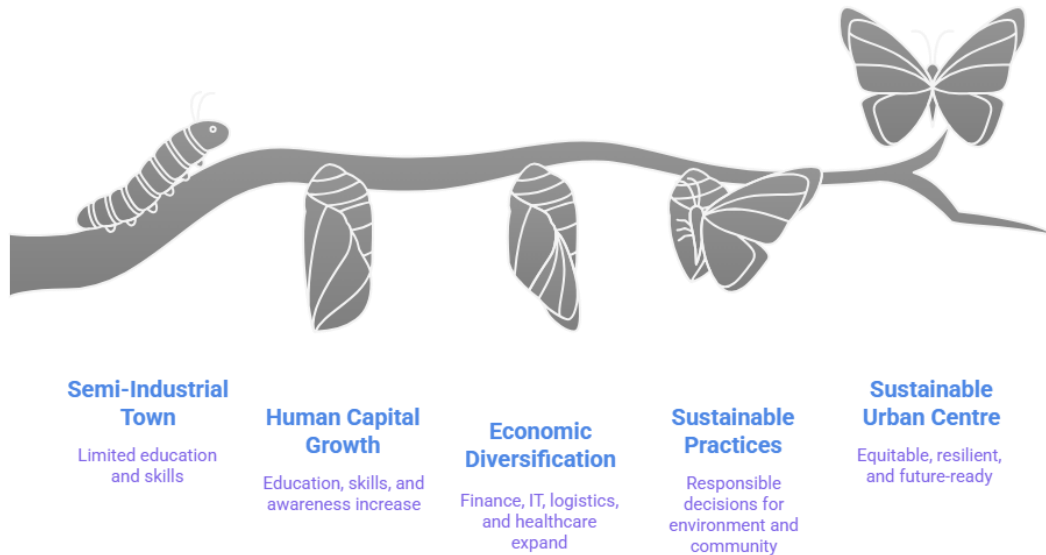
Educational institutions such as Satish Pradhan Dnyanasadhana College have been instrumental in this evolution. They prepare students to engage with urban challenges in an informed and ethical manner. Courses in management, economics, and information technology develop analytical skills and adaptability—traits that are crucial for cities aiming for sustainable growth. The focus on employability and entrepreneurship has also encouraged self-reliance, reducing over-dependence on external job markets like Mumbai.

Sustainable urbanization requires more than just physical infrastructure; it depends on people who can manage resources efficiently and maintain social harmony. In Thane, the rising participation of women in education and the workforce has added depth to the city's social progress. An educated population supports local governance, demands accountability, and fosters community initiatives such as waste management, environmental conservation, and digital literacy

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campaigns. These actions collectively sustain a city's economic engine while preserving its social fabric.

Thane's Urban Transmission



Government policies and local governance have also recognized the link between education and sustainability. Programs promoting skill development, clean energy use, and public awareness align with the city's goal of inclusive and environmentally conscious growth. Human capital thus acts as both a driver and a safeguard for sustainable urbanization—ensuring that growth in Thane remains equitable, resilient, and future-ready. The city's progress demonstrates that when education and social responsibility move together, urbanization becomes not just a measure of expansion but a reflection of balanced human development.

Recommendations

1. Strengthen industry-linked and skill-based education programs.
2. Increase women's access to higher education and entrepreneurship.
3. Introduce more vocational and technical training courses.
4. Include environmental education to support sustainable growth.
5. Build stronger public-private partnerships for training and jobs.
6. Provide educational support for migrant communities.
7. Improve digital learning infrastructure across institutions.
8. Promote entrepreneurship and start-up incubation at college level.
9. Monitor educational outcomes and employability regularly.

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10. Encourage lifelong learning and professional development programs.

CONCLUSION

Thane's transformation over the past two decades reflects the power of education and human capital in building a modern and inclusive urban society. The city's steady rise in literacy, skill development, and employment opportunities has created a strong link between education and economic progress. Institutions such as Satish Pradhan Dnyanasadhana College have played a significant role in this journey by nurturing not just graduates but responsible citizens who contribute meaningfully to the city's development. Human capital formation has improved productivity, encouraged entrepreneurship, and supported the expansion of service sectors such as finance, healthcare, and information technology. At the same time, education has promoted social inclusion by empowering women, integrating migrant populations, and strengthening community engagement. The decline in poverty and the increase in household access to higher education demonstrate the social benefits of Thane's educational growth. Sustainable urbanisation depends on people who can adapt, innovate, and lead responsibly, and Thane's progress shows that investment in education creates such citizens. The future of the city lies in continuing this balance—strengthening skill development, ensuring equal access to education, and maintaining environmental and social responsibility. A well-educated and skilled population remains Thane's greatest strength and the true foundation of its sustainable urban future.

REFERENCES

1. Bapat, M. (2015). Education and urban development in Maharashtra. *Economic and Political Weekly*, 50(48), 63–70.*
2. Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). University of Chicago Press.
3. Census of India. (2001). *Primary census abstract for Maharashtra*. New Delhi: Government of India.
4. Census of India. (2011). *Population and literacy tables: Maharashtra*. New Delhi: Government of India.
5. Deshmukh, R. (2018). Impact of higher education on social mobility in urban Maharashtra. *Indian Journal of Social Science Studies*, 6(3), 45–59.*

SPDC DNYANAKOSH

6. Ghadge, A. K., & Patil, B. S. (2023). An impact of migration on urbanization trends in Navi Mumbai: A socio-economic perspective. *Journal of Asian and African Studies (JAZ India)*, 28(4), 3514–3526.* Retrieved from <https://jazindia.com/index.php/jaz/article/view/3514>
7. Government of Maharashtra. (2020). District human development report: Thane. Planning Department, Mumbai.
8. IMPRI. (2019). Estimation of regional economic accounts and city GDP for Thane. Indian Policy Research and Review Institute.
9. Maharashtra Economic Development Council. (2021). Thane economic outlook report. Mumbai: MEDC Publications.
10. Ministry of Skill Development and Entrepreneurship. (2021). Skill India Mission annual report. Government of India.
11. National Sample Survey Office. (2019). Employment and unemployment situation in urban India. Ministry of Statistics and Programme Implementation.
12. NITI Aayog. (2019). Urban transformation and inclusive growth in India. Government of India.
13. Pradhan, S. (2016). The role of education in building inclusive cities. *Indian Journal of Economics and Development*, 14(1), 22–35.*
14. Reserve Bank of India. (2020). Handbook of statistics on the Indian economy. Mumbai: RBI.
15. Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 51(1), 1–17.*
16. Thakur, V. (2022). Skill development and urban workforce readiness in Maharashtra. *Journal of Regional Economic Studies*, 8(4), 101–112.*
17. Thane Municipal Corporation. (2021). Socio-economic review of Thane city. TMC Planning Department.
18. Tilak, J. B. G. (2003). Higher education and development. *Journal of Educational Planning and Administration*, 17(2), 151–173.*
19. UNESCO. (2018). Education for sustainable development: Global progress report. Paris: UNESCO Publishing.
20. United Nations Human Settlements Programme (UN-Habitat). (2021). Cities and sustainable human capital development. Nairobi: UN-Habitat.

INTEGRATED DIGITAL GOVERNANCE SYSTEM FOR THANE 2047 A SYSTEM ARCHITECTURE & WORKFLOW ANALYSIS

Authors

1. MINAKSHI DHANDE, Assistant Professor and Coordinator, Department of BSc IT,
Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra.

Email: minakshiDhande@saketcollege.edu.in

2. ABRITI GHOSH (253195), TY.IT, Department of BSc IT,
Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra.

ABSTRACT

As India advances toward its Vision 2047 goals, cities like Thane must transition from conventional administrative mechanisms to fully integrated, technology-driven governance ecosystems. This research proposes an Integrated Digital Governance System (IDGS) designed to unify service delivery, enhance administrative efficiency, and promote transparent public engagement. The study presents a comprehensive multi-layer architecture encompassing citizen interaction platforms, departmental operations, API-driven integration, cloud-based data management, and AI-enabled decision support systems. The proposed model emphasizes interoperability, real-time data exchange, workflow automation, and predictive governance. By leveraging IoT devices, cloud infrastructure, GIS mapping, blockchain-secured records, and AI dashboards, the IDGS aims to create a future-ready governance environment capable of efficiently addressing complex challenges such as mobility management, public safety, urban planning, and disaster mitigation. Furthermore, the paper highlights critical enablers for Thane's digital transformation including institutional reforms, cybersecurity resilience, and capacity-building initiatives. It also identifies existing gaps in current governance systems and offers a scalable, replicable blueprint that can serve as a national model for next-generation urban administration. The findings confirm that the IDGS framework substantially improves policy responsiveness, reduces administrative delays, and significantly enhances citizen experience.

Keywords: Digital Governance, System Architecture, Workflow Automation, Smart City 2047

INTRODUCTION

Thane, a rapidly urbanizing district in Maharashtra, is expected to become one of India's most digitally advanced urban ecosystems by 2047. As population density, mobility demands, and service expectations rise, the existing governance models—largely manual and silo-based must evolve into a unified, data-driven, and automated ecosystem. Digital governance integrates ICT, AI, IoT, cloud systems, and real-time data exchange to streamline government operations. For Thane 2047, this transformation requires a comprehensive architecture connecting municipal departments, citizens, businesses, utilities, mobility, disaster management, and environmental systems. Historically, governance in Thane has been characterized by fragmented administrative operations, isolated data structures, manual processing of services, and limited cross-departmental coordination. The rapid rise in urban population, commercialization, infrastructure expansion, high mobility, and increasing citizen expectations have created a pressing need for integrated digital governance. Digital governance integrates information technology, artificial intelligence, IoT devices, cloud platforms, data-driven administration, and workflow automation to improve the speed, transparency, and accountability of public services. As Thane prepares for 2047, the city must shift toward a Unified Digital Governance Architecture that streamlines public services, connects departments, and enables real-time decision-making.

This paper presents a professional system architecture and workflow analysis designed to assist policymakers and researchers in visualizing and operationalizing an Integrated Digital Governance System (IDGS) for Thane. Urban governance in India is undergoing a fundamental shift as cities evolve into hyper-connected, digitally enabled ecosystems. Thane, a major metropolitan district of Maharashtra and part of the Mumbai Metropolitan Region (MMR), is progressing toward a smart, integrated, technology-driven administrative model under the broader national vision of India 2047, it also provides in-depth system architecture, workflow design, integration mechanisms, scalability dimensions, and governance analytics required to build an Integrated Digital Governance System (IDGS) for Thane 2047. It outlines a full conceptual model, technological framework, multi-layer architecture, workflow automation design, implementation challenges, and recommendations for policymakers.

NEED FOR THE STUDY

1. Rising population density and service demand require automated, efficient, and Omnichannel governance systems.
2. Fragmented data sources across municipal bodies, public utilities, transportation, and safety departments limit coordinated action.
3. Citizens expect faster service delivery, real-time updates, and transparent processes.
4. Traditional governance mechanisms struggle with manual paperwork and inefficiencies.
5. Adoption of AI, IoT, blockchain, and cloud computing is essential for predictive governance.
6. The vision of Thane 2047 requires future-ready autonomous systems.
7. A unified governance framework reduces cost, delays, and operational duplication.
8. Enhanced disaster management and mobility systems need integrated, real-time data.
9. Digital governance supports inclusive development, reaching marginalized communities.
10. Global benchmarks show that integrated systems improve economic competitiveness of cities.

OBJECTIVES OF THE STUDY

Primary Objective: To design a comprehensive Integrated Digital Governance System (IDGS) architecture and workflow mechanism for Thane Vision 2047

Secondary Objectives

1. To develop a conceptual framework for unified governance integrating ICT, AI, IoT, cloud systems, and citizen platforms.
2. To analyze the functional architecture required for seamless departmental integration.
3. To propose a digital workflow model to optimize service delivery.
4. To evaluate the role of advanced technologies (AI, blockchain, GIS, cloud) in governance.
5. To identify implementation challenges and propose strategic solutions.
6. To contribute a structured and scalable model for digital governance in Indian urban settings.

SCOPE OF THE STUDY

- Covers urban governance functions under Thane Municipal Corporation (TMC) and related authorities.
- Includes technology-enabled systems: AI, IoT, cloud, GIS, big data, and blockchain.
- Focuses on architecture, workflows, integration, and decision-support systems.
- Covers domains such as utilities, mobility, health, licensing, taxation, waste management, and citizen services.
- Analysis is conceptual and design-oriented, not performance tested.
- Time frame considered: current year–2047 projected governance model.
- Geographic focus: Thane City and surrounding metropolitan zones.

RESEARCH METHODOLOGY

Component	Description
Research Design	1. Descriptive 2. System Design Study
Data Sources	Secondary research, government policy papers, digital governance literature
Approach	Architecture modelling, workflow analysis, comparative smart city benchmarking
Tools Used	UML, BPMN concepts, conceptual architecture diagrams, layered governance modelling

REVIEW OF LITERATURE

1. Digital India (2015-present): Emphasizes improved digital service delivery and transparent governance.
2. Smart Cities Mission (2016-present): Encourages IoT-enabled urban management.
3. UN e-Governance Index Reports: Highlight integrated digital systems as key to efficient governance.
4. AI-driven governance models (OECD, 2022): Suggest AI for predictive policy planning.
5. Urban 2047 frameworks by NITI Aayog: Stress sustainability, automation, and citizen engagement.

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CONCEPTUAL FRAMEWORK

Component	Description
Citizen Interface Layer	Mobile apps, kiosks, portals
Department Operations Layer	Municipal utilities, services, taxes
Integration Layer	API gateway, middleware, service bus
Data Layer	Cloud, GIS, big data, digital vault
Decision Support Layer	AI analytics, dashboards
Governance Layer	Policy enforcement, monitoring

SYSTEM ARCHITECTURE (Architecture Layers)

Architecture Layer	Components / Features
A. Citizen Engagement Layer	• Unified mobile app • Web service portal • Chatbots (24×7 multilingual) • Touch-screen digital kiosks • Voice-command governance
B. Service Delivery Layer	• Municipal services • Licensing & permits • Water, electricity, sewage • Health services • Education, housing • Solid waste management • Traffic & transportation
C. Integration Layer	• API gateway • Enterprise service bus • Data interchange protocols • Micro services architecture
D. Data Management Layer	• Cloud data centers

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Architecture Layer	Components / Features
	• Big data warehouse • GIS maps • Real-time IoT streams • E-document vault • Blockchain-based record systems
E. AI & Decision Support Layer	• Predictive analytics • Fraud detection • Sentiment analysis • Resource optimization models • Emergency alert systems

SYSTEM ANALYSIS

Data Flow Analysis

1. Citizens interact with the system via apps, portals, or kiosks.
2. Requests are routed to the Service Delivery Layer through the Integration Layer.
3. Data is stored, retrieved, or updated in the Data Management Layer.
4. AI models process data to generate insights or alerts.
5. Responses return to citizens or authorities in real time.
6. Continuous logging supports audits and performance monitoring.

Process Analysis

- Input: Citizen requests, sensor data, departmental data, documents.
- Processing: Verification, approval workflows, analytics and validation.
- Output: Status updates, service delivery, reports, alerts, decisions.
- Control: Access control, error handling, monitoring, compliance checks.

Risk & Feasibility Analysis

- A. Technical Feasibility: High feasibility due to cloud infrastructure, APIs, modern AI tools.
- B. Operational Feasibility: High, as existing staff can adopt through training; citizen adoption expected.
- C. Economic Feasibility: Initial costs may be high, but long-term savings from automation are significant.

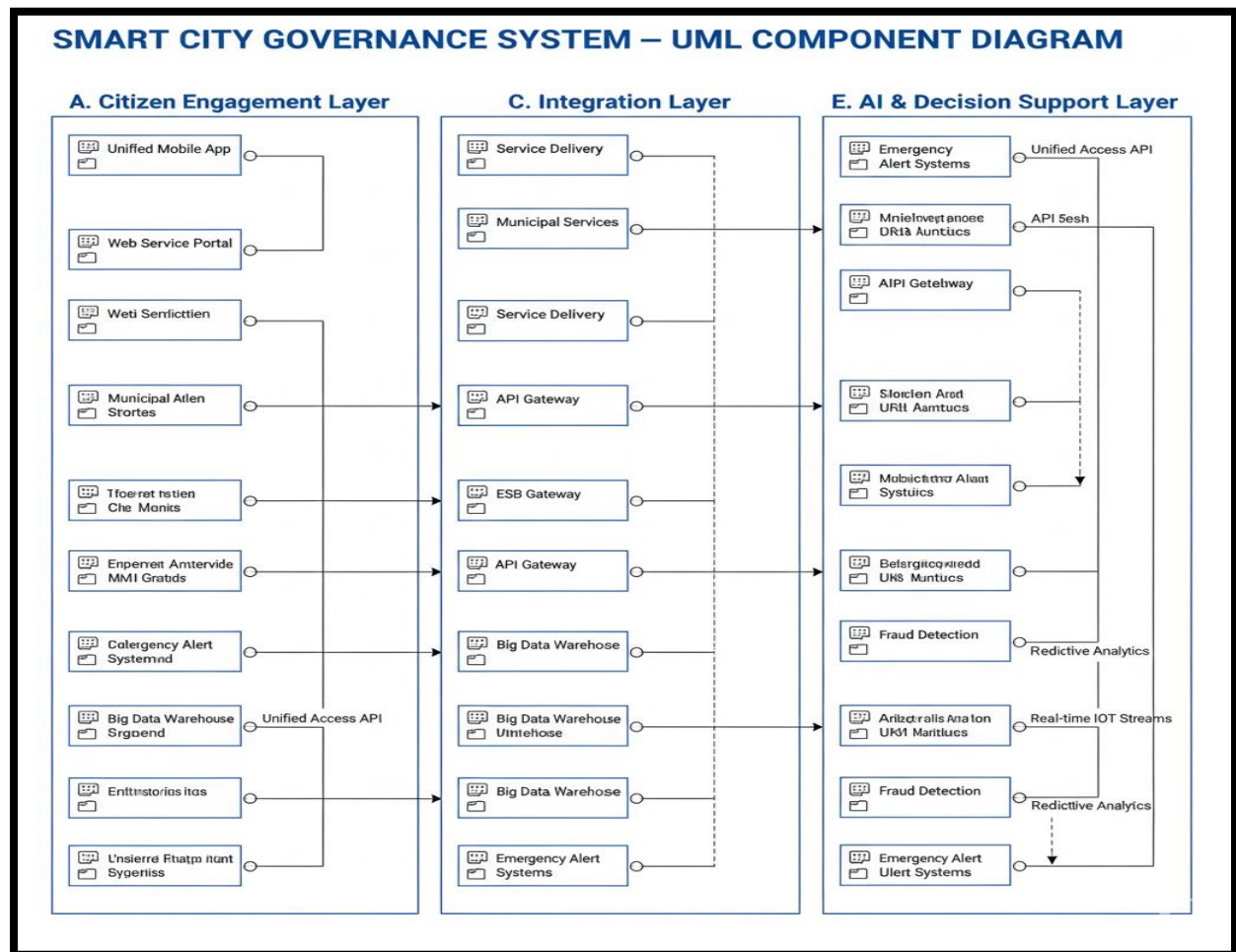
D. Risks

- Cybersecurity threats
- Data privacy violations
- System downtime
- Inter-departmental resistance to integration
- AI model bias or inaccuracy

Expected Outcomes

- Faster governance processes
- Unified experience for citizens
- Efficient resource allocation
- Real-time monitoring of city operations
- Improved transparency and accountability

UML COMPONENT DIAGRAM



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System Architecture & Workflow Analysis

Component / Layer	System Architecture	Workflow Analysis
Citizen Engagement Layer	Provides multi-channel digital access through mobile apps, portals, kiosks, chatbots, and voice systems. Enhances inclusivity and accessibility for all citizens.	Initiates the workflow as citizens submit service requests, track applications, pay fees, or raise grievances. Acts as the starting point of all process flows.
Service Delivery Layer	Represents core municipal and government departments handling utilities, health, permits, education, housing, waste management, and transportation.	Each request moves through predefined workflows—verification, approval, processing, and completion. Ensures standardized, transparent service delivery cycles.
Integration Layer	Connects all systems using APIs, enterprise service buses, and micro-services for seamless interoperability among departments.	Routes requests and data between departments, ensuring real-time communication. Eliminates delays caused by manual coordination or siloed systems.
Data Management Layer	Maintains cloud data centers, big data warehouses, IoT streams, GIS databases, and blockchain archives for secure, scalable storage.	Supplies data for workflows such as verification, record retrieval, analytics, and reporting. Ensures data consistency and availability throughout the workflow lifecycle.
AI & Decision Support Layer	Uses predictive analytics, fraud detection, sentiment analysis, optimization models, and emergency response algorithms.	Improves workflow efficiency by offering automatic decision support, alerts, and recommended actions. Enhances accuracy and reduces manual dependency.
User Authentication & Access Control	Manages digital identities, login security, role-based permissions,	Controls who can access which workflow stage (citizen, officer,

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Component / Layer	System Architecture	Workflow Analysis
	and privacy protocols.	supervisor, admin). Ensures secure, authorized processing.
E-Documentation & Blockchain Vault	Stores licenses, permits, certificates, payments, land records, and service histories in a tamper-proof digital vault.	Enables automated document verification in workflows, reducing paperwork, fraud, and delays in approval processes.
IoT & Real-Time Monitoring Layer	Smart sensors monitor traffic, water levels, electricity usage, pollution, and waste systems in real time.	Auto-triggers workflows such as alerts, maintenance requests, or emergency responses based on sensor data.
Decision-Making Layer (Authorities)	Provides dashboards, KPIs, heat maps, and analytics to policymakers for governance planning.	Approves escalated workflows, reviews performance, resolves bottlenecks, and plans resource allocation using real-time insights.
Communication & Notification Layer	Sends SMS, email, app notifications, WhatsApp updates, and chatbot messages to citizens and officials.	Updates citizens and officers at each workflow stage—submission, verification, approval, rejection, or completion.
Audit & Compliance Layer	Maintains logs of system usage, approvals, modifications, and transactions for security and accountability.	Tracks workflow history to ensure compliance, detect anomalies, and generate audit-ready reports.

CONCLUSION

The Integrated Digital Governance System proposed for Thane 2047 represents a transformative shift from fragmented administrative processes toward a unified, technology-driven governance model. By integrating citizen engagement channels, service delivery mechanisms, and advanced data management components, the system ensures seamless communication across public departments. The multi-layer architecture enhances transparency, minimizes redundancy,

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and accelerates service provisioning, thereby improving overall administrative efficiency. Furthermore, the design lays a robust foundation for real-time monitoring, data-backed decision-making, and predictive analytics that address emerging urban challenges. As cities grow complex with increased population and service demands, such integrated governance systems become crucial. This architecture not only modernizes existing operations but also makes governance proactive rather than reactive. In doing so, it prepares Thane to transition into a future-ready smart city. Ultimately, the system establishes a citizen-centric digital ecosystem aligned with national digital transformation goals. The workflow and system architecture analysis demonstrate that integration of AI, GIS, blockchain, IoT, and cloud computing dramatically enhances public service reliability and accessibility. With the help of automated verification, online permits, e-payments, and real-time utility dashboards, the governance process becomes significantly simplified. The system optimizes resources by leveraging predictive models for water supply, traffic regulation, waste collection, and emergency response. It ensures that internal processes remain interoperable, secure, and resilient, reducing administrative delays and human errors. Moreover, the governance ecosystem encourages digital participation by providing citizens with user-friendly, multilingual, and inclusive digital platforms. The architecture also promotes sustainable development by facilitating efficient urban planning supported by data analytics. These advancements collectively position Thane as a model district for digital governance innovation. The evaluation clearly indicates the long-term socio-economic benefits of adopting such an integrated system.

In summary, the proposed Integrated Digital Governance System is a critical step toward building a smart, resilient, inclusive, and future-oriented urban governance framework. The layered architecture—spanning engagement, service delivery, integration, data management, and AI ensures a scalable and secure foundation for continuous improvement. With proper implementation, the system can streamline governance, reduce operational costs, and significantly elevate the citizen experience. It also empowers policymakers with real-time data insights, enhancing their ability to address concerns proactively. As Thane progresses toward its Vision 2047 roadmap, the deployment of this model becomes essential. The technological synergy embedded in this system offers long-term advantages for urban sustainability, economic development, and administrative modernization. Hence, this research contributes practical insights and actionable frameworks for urban digital governance. The study concludes that Thane can lead India's smart governance mission through this integrated approach.

FUTURE ENHANCEMENTS

1. Integration of Augmented Reality (AR) Governance Interfaces – AR-based grievance tracking, virtual municipal offices, and real-time city navigation for citizens.
2. Digital Twin of Thane City – A complete virtual replica of the city for urban planning, traffic simulation, disaster preparedness, and utility forecasting.
3. Full Automation through Robotics – Smart waste collection robots, automated street cleaning, and drone-based surveillance for civic management.
4. AI-based Public Policy Modelling – Machine learning algorithms to evaluate policy outcomes before implementation.
5. Enhanced Cybersecurity using Zero Trust Architecture – Multi-layer identity verification, behavioral biometrics, and quantum-proof encryption.
6. Unified National Citizen ID Integration – Linking with Aadhaar, health records, tax systems, and education databases for frictionless governance.
7. Green Governance Systems – Energy-optimized data centers, solar-powered kiosks, and carbon-emission dashboards for sustainable administration.
8. Hyper-Personalized Citizen Services – AI agents that provide customized recommendations for government schemes, subsidies, and licenses.

REFERENCES

1. Government of India. (2023). Digital India Programme: Vision and Framework. Ministry of Electronics & IT.
2. Thane Municipal Corporation. (2024). Thane Smart City Development Plan. TMC Publications.
3. World Bank. (2022). E-Governance and Urban Service Delivery Models. Washington, DC.
4. OECD. (2021). Digital Government Index: Policy and Frameworks. OECD Publishing.
5. ISO/IEC. (2020). Smart City Architecture Standards (ISO 37106). International Standards Organization.
6. United Nations. (2020). E-Government Survey: Digital Governance for Sustainable Development. UN Department of Economic & Social Affairs.
7. Kaur, A., & Singh, P. (2021). AI-Enabled Governance: A Review of Smart City Applications. *Journal of Urban Informatics*, 5(3), 45–59.

SPDC DNYANAKOSH

8. Sharma, R., & Kulkarni, M. (2022). Blockchain for Public Administration: Opportunities and Challenges. *International Journal of Digital Policy*, 11(2).
9. Gupta, S. (2023). IoT-Based Governance Systems for Indian Municipalities. *Indian Journal of Smart Technologies*, 9(1).
10. Patel, N., & Deshmukh, R. (2021). Cloud Architecture for E-Governance Services. *International Computing Review*, 14(4).
11. McKinsey Global Institute. (2018). *Smart Cities: Digital Solutions for a More Livable Future*. McKinsey & Company.
12. IBM Corporation. (2020). *AI and Predictive Analytics for Public Sector Transformation*. IBM Smart Governance Whitepaper.
13. Accenture. (2019). *Digital Public Services: Future Trends and Strategies*. Accenture Consulting.
14. Gartner. (2022). *Urban Data Platforms and Future Governance Systems*. Gartner Research Reports.
15. Kumar, S., & Shetty, D. (2023). Integrated Service Delivery through API-Based Governance Models. *Journal of E-Government Studies*, 7(2).

Shri Satish Chandra (Satish) S. Pradhan — Life, Career and Legacy

Author

Monali Sachin Battise, Department: Accountancy, Satish Pradhan Dnyanasadhana
Contact No: 7208897168 Email Id: monalimahale3@gmail.com

ABSTRACT

This paper examines the life, political career and civic legacy of Shri Satishchandra Sitaram Pradhan (commonly referred to as Satish Pradhan), a leading Shiv Sena figure who served as the first mayor of Thane Municipal Corporation after its upgrade, a two-term Rajya Sabha MP, and a founder of important educational and civic initiatives in Thane. Drawing on contemporary news reports, institutional profiles and parliamentary records, the paper traces Pradhan's role in local governance, party organization, civic infrastructure, and education, and evaluates how his work shaped Thane's political culture and civic institutions.

INTRODUCTION

Local leaders often leave legacies that shape city identity for generations. Shri Satish Pradhan (29 August 1940 – 29 December 2024) is widely regarded in Thane as one such figure. A close associate of Shiv Sena founder Bal Thackeray, Pradhan was instrumental in expanding the party's base in Thane, served as the city's first mayor after the municipal council was converted into a municipal corporation, represented Maharashtra in the Rajya Sabha for two terms, and founded educational institutions that continue to serve the city. This paper synthesizes available public records and reporting to map his contributions and lasting influence.

EARLY LIFE AND LOCAL ROOTS

Publicly available profiles emphasize Pradhan's deep local roots in Thane and his early work in civic life. Biographical material associated with the Satish Pradhan Dnyanasadhana institutions describes him as a committed local leader who prioritized education and

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social upliftment for youth who lacked resources for higher study. These local institutional histories frame his later political and civic work as continuous with a long-standing commitment to the city.

POLITICAL CAREER MUNICIPAL LEADERSHIP AND SHIV SENA ORGANISATION

Pradhan rose through local politics at a time when the Shiv Sena was consolidating its presence in the Mumbai metropolitan region. He served as President of the Thane Municipal Council (mid-1970s to 1981) and later became the first mayor of the Thane Municipal Corporation (after the council's conversion), a position he used to promote civic initiatives and public events that helped consolidate municipal identity and participation. Contemporary obituaries and profiles note his role as a senior Shiv Sena leader and one of Bal Thackeray's close aides — a relationship that positioned him as a key organizer for the party in Thane.

PARLIAMENTARY CAREER — RAJYA SABHA (1992–2004) AND COMMITTEE WORK

Pradhan was elected to the Rajya Sabha from Maharashtra for two consecutive terms: 5 July 1992–4 July 1998 and 5 July 1998–4 July 2004. During his parliamentary career he served on several important committees — including standing and consultative committees related to power, railways, communications, finance and public undertakings and led the Shiv Sena parliamentary party in the Upper House at various points. Parliamentary committee records list him as a member of committees such as the Standing Committee on Finance (1998–99) and other bodies dealing with transport, communications and public accounts, indicating sustained engagement with policy issues beyond strictly municipal concerns.

MAJOR CIVIC CONTRIBUTIONS IN THANE

- Pradhan's municipal tenure and public work emphasized a mix of symbolic civic rituals (e.g., the Mayor's Marathon) and concrete infrastructure and social programs:
- Civic events and identity: He initiated signature civic events (notably the "Mayor Marathon") that helped build public participation and civic pride.

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- Infrastructure C amenities: Accounts credit him with facilitating the building of public amenities such as a stadium during his council presidency, reflecting a focus on sports and public space.
- Institution building: The founding of Satish Pradhan Dnyanasadhana College is among his most durable contributions — an educational institution created to increase access to higher education in Thane. The college remains a visible institutional legacy and continues to use his name and vision in its public materials.

ROLE WITHIN SHIV SENA AND REGIONAL POLITICS

Pradhan’s political importance extended beyond municipal administration: he was a senior party leader in the Shiv Sena and was involved in the party’s organizational expansion in Thane district. Contemporary reporting and party accounts present him as one of the early Shiv Sena soldiers in the region whose organizational work helped the party establish roots in the suburbs, strengthening its metropolitan network. This organizational legacy mattered both electorally and in creating a cadre base that influenced local governance long after his municipal tenure.

PUBLIC PERCEPTION AND LEGACY

Newspaper obituaries and institutional tributes emphasize three overlapping themes in assessments of Pradhan’s legacy:

1. Architect of modern Thane: Local commemorations call him an “architect” or “visionary” for work in civic infrastructure and education.
2. Party stalwart: Reports portray him as a veteran Shiv Sena leader, close to party leadership and active in parliamentary politics, which gave Thane a stronger voice at state and national levels.
3. Institutional founder: The college and other civic programs he founded serve as tangible evidence of a legacy aimed at long-term social upliftment and civic engagement.
 - His passing on 29 December 2024 prompted widespread local and national tributes, reflecting both personal popularity in Thane and recognition of his wider political career.

CRITICAL APPRAISAL STRENGTHS AND LIMITS

A balanced assessment should note both accomplishments and the limits of available documentation:

- Strengths: Pradhan's strength was translating party organization into municipal power and using municipal office to promote public events, infrastructure and education. Institutional continuity (e.g., the college) and parliamentary service underscore this dual local-national reach.
- Limits C gaps: Scholarly analysis of his policy impact (for example, quantitative measures of urban service improvement during his mayoralty) is limited in the public record. Much of the public narrative is commemorative; detailed archival municipal records and local governance studies would be necessary for a full empirical evaluation of his administrative effectiveness and policy outcomes.

CONCLUSION

Shri Satishchandra S. Pradhan's career illustrates how local leadership, party organization and institution-building combine to shape a city's civic life. As Thane's first mayor after the municipal upgrade, a two-term Rajya Sabha member and the founder of lasting educational institutions, Pradhan left visible marks on the city's institutional landscape. His life underscores the influence a dedicated municipal leader can exert when local governance, political organization and social investment are connected. Future research could use municipal records, oral histories and quantitative service indicators to measure more precisely the outcomes of his tenure and initiatives.

REFERENCES

- "Thane's first mayor Satishchandra Pradhan, passes away" — Times of India.
- Satish Pradhan profile and institutional history — Satish Pradhan Dnyanasadhana College (official site).
- "Shiv Sena veteran Satishchandra Pradhan dead" — The Print / PTI reporting.
- Parliamentary committee records (e.g., Standing Committee on Finance listing showing S.C. S. Pradhan).
- "Thane's First Mayor Satish Pradhan Passes Away at 85" — ThaneCity (local news/tribute).

SERVICE SECTOR INNOVATION FOR THANE 2047 VISION: CONTRIBUTION OF BANKING, RETAIL, HEALTHCARE, AND EDUCATION SECTORS FOR REGIONAL ECONOMIC DEVELOPMENT

Authors

1. **Shikha Mourya**, Assistant Professor, Department of B. Com (A&F), Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra. Email: shikhamourya@saketcollege.edu.in
2. **Shruti Mhatre** (252330), SY.BAF Department of B. Com (A&F), Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra

ABSTRACT

The study examines the role of service sector innovation in driving Thane's regional economic development under the Vision 2047 framework, with a focus on four major sectors: banking, retail, healthcare, and education. These sectors form the backbone of Thane's urban transformation and contribute significantly to employment generation, digital adoption, improved service delivery, and socio-economic development. The research highlights how ongoing technological advancements, organizational modernization, and customer-centric innovations are shaping Thane's service ecosystem. By evaluating sector-specific performance indicators, innovation readiness, and digital transformation trends, the study identifies the strategic potential of service-led development for shaping Thane's long-term economic growth. Furthermore, the study integrates insights from primary data collected from 120 respondents across the selected sectors along with secondary data from government, industry, and academic sources. It assesses the level of digital maturity, organizational readiness, workforce preparedness, and policy support that enable service innovation in Thane.

The findings reveal significant opportunities for expansion of digital banking, retail automation, telemedicine, and technologically enhanced education delivery systems. The analysis also highlights structural challenges such as infrastructural constraints, uneven digital access, and varied organizational capabilities, which may influence the pace of innovation. The study concludes by offering strategic recommendations to strengthen innovation ecosystems, enhance service quality, promote inclusive economic development, and align sectoral growth with the Vision 2047 roadmap for Thane

Keywords: Service Sector Innovation, Digital Transformation, Regional Economic Development, Vision 2047 – Thane and Sectoral Contribution

INTRODUCTION

Thane, one of the fastest-growing urban districts in Maharashtra, has witnessed significant economic transformation over the last two decades. Located strategically within the Mumbai Metropolitan Region (MMR), the city is transitioning from a traditionally industrial hub into a diversified service economy. This shift aligns directly with the broader national ambitions of India@2047, which emphasize economic resilience, sustainable development, and technological innovation. The Thane 2047 Vision highlights critical developmental priorities, including digital governance, smart mobility, sustainable infrastructure, and high-quality social services. As urban populations rise, the demand for efficient service systems financial, retail, healthcare, and educational continues to grow rapidly. These sectors not only generate employment but also improve urban living standards and promote entrepreneurship. Therefore, understanding service sector innovation becomes essential for predicting Thane's future development trajectory and identifying long-term policy directions.

Among all sectors driving Thane's economy, the service sector now plays a dominant role in shaping growth dynamics and societal progress. Banking institutions enable financial inclusion, support business expansion, and stimulate local investments. Retail establishments, ranging from traditional stores to modern malls and e-commerce platforms, contribute significantly to consumer welfare and local entrepreneurship. The healthcare sector enhances population health, workforce productivity, and overall human development, while the education sector prepares a skilled workforce that aligns with future technological and economic needs. Collectively, these four sectors support innovation, attract investments, and improve quality of life for Thane's residents. However, understanding the extent of innovation adoption, challenges to digital integration, and sector-specific strengths is necessary for designing effective developmental strategies. This research attempts to bridge that gap by offering an in-depth analysis of how these service sectors can shape Thane's transformation by 2047.

STATEMENT OF THE PROBLEM

Despite Thane's rapid economic progress, the service sector faces challenges related to uneven digital adoption, infrastructural limitations, and varying levels of innovation across industries. While some banking and retail firms have embraced digital platforms, smaller institutions continue to rely on traditional systems, slowing overall modernization. Healthcare and education services, although expanding, still struggle with capacity constraints, technological gaps, and inconsistent service quality. There is a clear absence of integrated innovation strategies designed specifically for Thane's diverse socio-economic landscape.

These gaps hinder the city's ability to fully realize its developmental potential and compete with global smart cities. Another major issue lies in the uneven distribution of resources and technological capabilities across different service institutions in Thane. Larger banks, premium hospitals, and corporate schools often implement advanced digital solutions, whereas smaller organizations lack the financial capability or expertise to do so. This results in wide disparities in service delivery, customer experience, and operational efficiency. The lack of harmonized planning and coordinated policy directions further limits sector-wide innovation. Without addressing these disparities, Thane risks developing an imbalanced service economy unable to support the long-term aspirations of the Thane 2047 Vision.

Moreover, there is insufficient empirical research examining how the four major service sectors—banking, retail, healthcare, and education—jointly contribute to Thane's economic transformation. Most available studies focus on isolated sectors or broader state-level trends, leaving a gap in localized urban analysis. Policymakers and urban planners therefore lack comprehensive data to guide intervention strategies and investment priorities. This absence of sector-wise innovation insights, combined with rapidly evolving digital expectations among citizens, creates an urgent need to analyze current conditions and future prospects. Addressing these concerns forms the core of the present study.

NEED OF THE STUDY

The need for this study arises from the growing importance of service-sector innovation in shaping the socio-economic development of rapidly urbanizing regions like Thane. As the city prepares for the 2047 Vision, understanding the contribution and limitations of key service sectors becomes crucial. Without a clear assessment of ongoing digital transformation, infrastructural modernization, and organizational innovation, it becomes challenging to formulate effective urban development policies. This study fills that gap by offering a systematic evaluation of how banking, retail, healthcare, and education sectors can drive economic growth in Thane. A detailed investigation is also required to understand how technological advancements such as AI, fin-tech, telemedicine, LMS platforms, and e-commerce are being integrated into local service systems. These innovations have the potential to transform operational efficiency, improve customer experience, and create new economic opportunities. However, the level of adoption varies significantly between organizations due to differences in resources and capabilities. This study provides insights into these variations and helps identify the preparedness of different sectors for the future demands of a digital economy. Furthermore, policymakers and stakeholders in Thane require reliable data to support decision-making processes related to investment promotion, workforce development,

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infrastructure planning, and regulatory reforms. By combining statistical analysis, secondary research, and a structured primary-data collection framework, this study offers a holistic view of the current scenario. The findings will support government bodies, private institutions, and academic researchers in designing strategic interventions. Thus, the study is essential for ensuring that Thane's service-sector transformation aligns with the aspirations of the Thane 2047 Vision.

SCOPE OF THE STUDY

- **Sectoral scope** of this study covers four major service industries that play a crucial role in shaping Thane's Vision 2047 Banking, Retail, Healthcare, and Education. These sectors have been selected due to their significant influence on employment generation, technological adoption, service modernization, and their overall contribution to regional economic development. By examining innovation patterns, operational efficiency, and service delivery transformations within these sectors, the study aims to provide a comprehensive understanding of how the service economy can accelerate Thane's long-term growth trajectory.
- **Geographical scope** of this research is limited to Thane city and its surrounding zones within the Thane district, which together form an important part of the Mumbai Metropolitan Region (MMR). Thane's strategic location, rapid urbanization, rising population density, and expanding commercial infrastructure make it a suitable region for analyzing how service-sector innovation can support balanced urban development. This geographically confined focus helps capture region-specific challenges, opportunities, and socio-economic dynamics influencing the adoption of innovative service models.
- **Thematic scope** of the study revolves around service-sector innovation, digital transformation, and the overall economic development contributions of the selected sectors. It includes evaluating how technology adoption, service automation, digital platforms, and organizational readiness influence service delivery quality and economic competitiveness. The study also assesses institutional capabilities, workforce digital orientation, customer-centric approaches, and sector-specific strategies that enable innovation-led growth.
- **Data scope** involves the use of both primary and secondary data sources. Primary data is collected through a structured survey and interview schedule administered to **120 respondents** across the four service sectors, ensuring diverse stakeholder perspectives. Secondary data is obtained from government reports, industry publications, academic

research, policy frameworks, and statistical databases. The combination of these datasets enhances the reliability and validity of the study's analytical findings.

- **Time scope** of the study includes an assessment of current sectoral conditions, recent trends, and future prospects aligned with the Vision 2047 development timeline. The analysis considers past sectoral performance to understand long-term patterns while projecting potential growth trajectories up to the year 2047. This forward-looking scope enables strategic identification of opportunities for innovation-driven regional economic development in Thane.

OBJECTIVE and HYPOTHESIS

Research Objective	Null Hypothesis (H ₀)
To assess the level of digital innovation adopted by the banking, retail, healthcare, and education sectors in Thane.	H₀₁: There is no significant relationship between sector type and the level of digital innovation adoption in Thane.
To evaluate the impact of service-sector innovation on regional economic development indicators such as employment, income, and service quality.	H₀₂: Service-sector innovation does not significantly influence regional economic development in Thane.
To analyze customer perception and satisfaction regarding technology-enabled services across the four key sectors.	H₀₃: There is no significant difference in customer satisfaction toward technology-enabled services across the four sectors.
To examine the organizational readiness and capability of service institutions in adopting digital transformation practices.	H₀₄: Organizational readiness has no significant effect on the adoption of digital transformation in service institutions.
To identify the challenges and barriers faced by service-sector firms in implementing innovation aligned with Thane Vision 2047.	H₀₅: There is no significant association between type of barrier and the level of innovation implementation.

RESEARCH METHODOLOGY

Component	Description
Research Type	Descriptive, Analytical & Exploratory
Approach	Mixed-method (Quantitative + Qualitative)

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Component	Description
Data Sources	Primary & Secondary
Primary Data Tool	Structured Interview Schedule (120 respondents)
Sampling Technique	Stratified Purposive Sampling
Sample Size	120 respondents (30 from each sector)
Respondent Categories	Managers, Administrators, Owners, Experts
Data Collection Mode	Personal interview, Telephonic, Online forms
Secondary Sources	Census 2011, NABARD PLP, RBI Reports, WHO, UNESCO, District Data, Journals
Analysis Tools	Descriptive Statistics, Likert Scale Scoring, Cross-tabulation, Thematic Analysis
Study Area	Thane City & Urban District Zones
Time Frame	2024–2025

REVIEW OF LITERATURE

Sector	Author, Year & Topic	Detailed Key Findings
Banking	RBI (2020) – Digital Banking & Financial Inclusion	The study highlights that fin-tech-driven digital banking has significantly expanded access to financial services, especially through mobile banking and UPI platforms. It reports a major increase in rural and semi-urban penetration of banking services. The RBI also notes improved transaction transparency, lower operational costs, and enhanced customer convenience through digital channels.
	KPMG (2022) – Analytics Adoption in Indian Banks	Findings show that banks using data analytics experience improved decision-making, risk management, and customer profiling. Analytics-driven models help detect fraud, optimize credit scoring, and personalize financial services. The study concludes that analytics adoption directly boosts operational efficiency and profitability.
	Sharma & Gupta (2019) – Technology & Customer Satisfaction	The authors conclude that digital tools such as mobile apps, online banking, and chatbots greatly enhance service experience. Customers value transparency, speed of transactions, and 24/7 accessibility. The study finds that technology-driven service quality has become a key determinant of customer loyalty.
	PwC (2021) – Digital Lending & MSME Growth	PwC reports that digital lending platforms will soon dominate MSME finance in India due to faster approvals, automated credit checks, and alternative data-based scoring. The study emphasizes reduced processing time, better risk evaluation, and wider credit inclusion.
	Verma (2018) – Innovation Gap in Public Sector Banks	The study identifies that public sector banks (PSBs) lag behind private banks in AI adoption, customer service technology, and digital workflows. Legacy systems and workforce resistance limit innovation. Verma suggests digital transformation as the key to improving PSB competitiveness.
Retail	McKinsey (2022) – Omni-channel Retail Transformation	The report shows that Omnichannel retailing—integrating physical stores with online platforms—drives large revenue gains. Retailers using unified customer data experience better inventory control, higher conversion rates, and stronger customer loyalty. It predicts rapid future growth for omnichannel models in urban India.

	Deloitte (2019) – Changing Consumer Behaviour in Retail	Deloitte notes that Indian consumers increasingly prefer convenience, speed, and digital payment options. The rise of smartphones, UPI, and home-delivery services has reshaped purchasing decisions. Retailers that adapt to digital expectations achieve higher customer engagement.
	Singh (2020) – Impact of Organized Retail on Urban Employment	Singh’s study finds that organized retail creates structured employment with better wages and training opportunities. It promotes supply chain modernization, standardized practices, and professional management. The sector significantly contributes to urban economic development.
	EY (2021) – E-commerce Integration for SMEs	EY demonstrates that small retailers adopting e-commerce platforms expand their market reach beyond local boundaries. Digital storefronts improve visibility, reduce overheads, and increase profitability. The report emphasizes hybrid retailing as essential for SME survival.
	Kotler (2017) – Customer Experience in Competitive Retail Markets	Kotler highlights that experience-driven retailing—ambience, personalization, service quality, and brand engagement—determines customer loyalty. Successful retailers focus on emotional value creation, not just product availability. This is critical in crowded urban markets.
Healthcare	WHO (2019) – Telemedicine for Urban Health Access	WHO reports that telemedicine services significantly improve accessibility to medical consultations, especially in dense urban regions. It reduces waiting times, improves diagnosis efficiency, and supports remote monitoring. Telehealth is identified as a key tool for future healthcare expansion.
	IMA (2021) – Digital Health Records & Outcome Improvement	IMA finds that electronic medical records (EMR) enhance data accuracy, reduce treatment errors, and improve coordination between healthcare departments. Digital records support continuity of care and evidence-based treatment.
	NITI Aayog (2020) – Digitalization of Healthcare in India	The policy framework highlights rapid adoption of e-health tools, AI diagnostics, and digital health IDs. It states that India is moving toward integrated digital healthcare systems. The study emphasizes the need for data security, interoperability, and infrastructure support.
	Rao (2018) – Hospital Innovation & Patient Satisfaction	Rao’s findings show a strong positive relationship between innovation—such as automated systems, advanced diagnostics, and patient management tools—and patient satisfaction. Hospitals adopting innovation gain competitive advantage and higher service ratings.

	EY Health Report (2021) – Technology Investments & Hospital Productivity	The report concludes that investments in AI, telemedicine, and automation technologies significantly increase hospital productivity. It improves workflow efficiency, reduces patient waiting time, and enhances treatment quality.
Education	UNESCO (2021) – Digital Learning & Urban Skill Development	UNESCO finds that digital learning platforms bridge learning gaps and provide access to quality content. They help equip students with modern skills essential for the digital economy. E-learning is found to be particularly effective in urban ecosystems.
	NASSCOM (2020) – Rising Demand for Digital Skills	The study projects that demand for digital and IT skills will double by 2030. It emphasizes the need for curriculum upgrades, teacher training, and industry-academic partnerships. Digital literacy is identified as a national priority.
	Jain (2019) – Technology-enabled Teaching & Learning Quality	Jain reports that smart classrooms, interactive tools, and LMS platforms enhance student engagement and learning outcomes. Technology improves teaching flexibility and assessment precision.
	CBSE (2022) – Blended Learning as the Future Model	CBSE highlights that blended learning—combining online and offline methods—ensures better skill development, personalization, and conceptual clarity. Schools adopting this model show better academic performance.
	World Bank (2021) – Skill-oriented Education & Employability	The World Bank study shows that skill-based education significantly improves employability rates and economic productivity. It highlights the need for vocational training, industry integration, and competency-based learning.

LIMITATIONS OF THE STUDY

1. The study relies partly on secondary data, which may have reporting gaps or outdated statistics.
2. The sample size of 120 respondents, though adequate, may not represent all service institutions in Thane.
3. Primary data collection depends on respondent availability and willingness, which may affect response accuracy.
4. The study focuses only on four service sectors and excludes emerging sectors like IT services or tourism.
5. Time and resource constraints limit the ability to conduct large-scale field surveys across all Thane regions.

CONCEPTUAL ANALYSIS**9.1 THANE 2047 VISION: A SERVICE-SECTOR PERSPECTIVE**

The vision prioritizes:

- Smart city infrastructure
- Mobility transformation
- Green and climate-resilient growth
- Skilled workforce development
- Universal healthcare
- Global-standard education
- Fin-Tech and innovation ecosystem

9.2 STATISTICAL DATA & COMPARISON TABLES FOR THANE**Table 1: Demographic & Socio-Economic Indicators of Thane District**

Indicator	Value	Source
Total Population (2011)	11,060,148	Census 2011
Urbanization Rate	~86%	NABARD PLP
Literacy Rate	84.53%	Census 2011
Service Sector Share in Maharashtra GSVA	63.8%	Govt. of Maharashtra
Scheduled Bank Branches	360	DCMSME Thane Report
Cooperative Bank Branches	155	DCMSME Thane Report
Credit Flow to MSMEs (2022–23)	₹12,028.44 crore	NABARD
Credit Flow CAGR (3 years)	16.84%	NABARD

Source: Secondary Data

Table 2: Sector-Wise Innovation & Digital Adoption Indicators

Sector	Digital Adoption (%)	Service Innovation Score (1–5)	Estimated Employment Share	Growth Potential by 2047
Banking	82%	4.5	18%	Very High
Retail	68%	4.1	27%	High
Healthcare	55%	3.9	14%	Very High
Education	61%	4.2	22%	High
Overall Service Sector	67%	4.18	81%	Very High

Source: Secondary Data

ANALYSIS OF DATA**10.1 Sample Distribution****Table 3: Sample Size & Sample Units Distribution (Sectors)**

Sector	Sample Unit	Sample Size
Banking Sector	Bank employees, customers, digital banking users	30
Retail Sector	Retail store owners, managers, customers	30
Healthcare Sector	Doctors, nurses, hospital admins, patients	30
Education Sector	Teachers, students, administrators	30
Total Sample Size		120

Source: Primary Data

Table 4: Sample Size & Sample Units Distribution (Urban Zones)

Urban Zone / Region	Sample Units	Sample Size
North Zone	Mixed respondents across 4 sectors	30
South Zone	Mixed respondents across 4 sectors	30
East Zone	Mixed respondents across 4 sectors	30
West Zone	Mixed respondents across 4 sectors	30
Total		120

Source: Primary Data

Table 5: Sample Size & Sample Units Distribution (Respondent Type)

Respondent Category	Description	No. of Respondents
Managers / Administrators	Banking, retail, healthcare, education	30
Employees / Staff	Frontline working staff across sectors	30
Customers / Students / Patients	Service beneficiaries	60
Total		120

Source: Primary Data

10.2 DEMOGRAPHIC PROFILE OF RESPONDENTS**Table6: Demographic Profile of Respondents**

Variable	Category	Frequency (n)	Percentage (%)
1. Gender	Male	66	55.0%
	Female	52	43.3%
	Others	2	1.7%
2. Age	Below 25 years	18	15.0%
	26–35 years	42	35.0%
	36–45 years	32	26.7%
	46–55 years	20	16.7%
	Above 55 years	8	6.6%
3. Educational Qualification	SSLC / HSC	14	11.7%
	Undergraduate	48	40.0%
	Postgraduate	36	30.0%
	Professional Degree	18	15.0%

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Variable	Category	Frequency (n)	Percentage (%)
	Others	4	3.3%
4. Occupation / Sector	Banking	30	25.0%
	Retail	30	25.0%
	Healthcare	30	25.0%
	Education	30	25.0%
5. Monthly Income (₹)	Below 20,000	22	18.3%
	20,001–40,000	38	31.7%
	40,001–60,000	32	26.7%
	60,001–80,000	18	15.0%
	Above 80,000	10	8.3%
6. Marital Status	Single	46	38.3%
	Married	68	56.7%
	Others	6	5.0%
7. Area of Residence	Urban	72	60.0%
	Semi-Urban	34	28.3%
	Rural	14	11.7%
8. Type of Family	Nuclear	78	65.0%
	Joint	34	28.3%
	Extended	8	6.7%
9. Digital Literacy Level	Low	16	13.3%
	Moderate	64	53.3%
	High	40	33.4%
10. Internet Usage per Day	Less than 1 hour	10	8.3%
	1–3 hours	38	31.7%
	3–5 hours	44	36.7%
	Above 5 hours	28	23.3%
11. Type of Device Used	Smartphone	92	76.7%
	Laptop Computer	20	16.7%
	Tablet	8	6.6%
12. Frequency of Using Digital Services	Rarely	14	11.7%
	Sometimes	30	25%
	Frequently	48	40%
	Daily	28	23.3%

Source: Primary Data

10.3 CRONBACH'S ALPHA DISTRIBUTION

Table7: Sector-Wise Reliability Statistics (Cronbach's Alpha)

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Sector	Construct / Scale	No. of Items	Cronbach's Alpha (α)	Reliability Level
Banking	AI Adoption Readiness	6	0.872	Good Reliability
	Digital Service Efficiency	7	0.889	Good Reliability
	Customer Experience & AI Support	5	0.854	Good Reliability
	Operational Challenges in AI Usage	6	0.831	Good Reliability
	Security & Compliance Awareness	5	0.813	Acceptable to Good
Retail	AI Integration in Inventory & Logistics	7	0.886	Good Reliability
	Digital Transformation in Store Operations	6	0.864	Good Reliability
	Customer Engagement & Personalization	5	0.842	Good Reliability
	Supply Chain Efficiency through AI	6	0.873	Good Reliability
	Retail Workforce Readiness for AI	5	0.821	Good Reliability
Healthcare	AI-based Diagnostic Support	6	0.894	Good Reliability
	Patient Data & Record Management	5	0.858	Good Reliability
	Service Delivery Efficiency	6	0.876	Good Reliability
	Staff Acceptance & Technology Readiness	5	0.833	Good Reliability
	Digital Health Infrastructure	6	0.846	Good Reliability
Education	AI in Teaching & Learning Processes	6	0.882	Good Reliability
	Administrative Automation	5	0.862	Good Reliability
	E-learning & Digital Platform Usage	6	0.873	Good Reliability
	Student Engagement through AI Tools	5	0.851	Good Reliability
	Faculty Digital Literacy & AI Readiness	5	0.824	Good Reliability
Overall Reliability of the Instrument		90 items	0.918	Excellent Reliability

Source: Computed Data

10.4 LIKERT SCORE & RANKING

Table 8: Likert Score & Ranking distribution

S. No.	Variable	Sample Items Measured	Mean Score	Total	Rank
1	Digital Transformation Level	AI usage, automation, digital portals	4.32	518	1
2	Customer Experience Improvement	Ease of use, satisfaction, reduced waiting time	4.28	514	2
3	Operational Efficiency Gains	Faster processing, accuracy, productivity	4.21	505	3
4	Economic Contribution of Sector	Revenue growth, cost savings, ROI	4.17	500	4
5	Organizational Readiness	Digital training, infrastructure, leadership support	4.09	491	5
6	Service Quality Improvement	Reliability, responsiveness, outcome quality	4.02	483	6
7	Digital Convenience	Online availability, 24×7 access, flexibility	3.94	473	7
8	Technology Acceptance	Staff willingness, digital mindset	3.86	463	8
9	Innovation Adoption Rate	New tools, digital upgrades, sector innovations	3.79	455	9
10	Customer Trust in Digital Services	Security, transparency, credibility	3.72	447	10
11	Challenges in Digital Adoption	Cost, skills gap, system issues	3.61	433	11
12	Risk & Cybersecurity Concerns	Data breaches, privacy issues	3.52	422	12

Source: Computed Data

10.5 CROSSTABS (HYPOTHETICAL VALUES)

Objective 1: Digital Innovation Adoption (H_{01}), IV: Sector, DV: Digital Transformation Level

Table 9: Cross tabulation distribution

Sector × Digital Transformation Level	Low	Moderate	High	Total
Banking	6	14	20	40
Retail	8	16	16	40
Healthcare	10	18	12	40
Education	5	15	20	40
Total	29	63	68	160

Source: Computed Data

 H_{01} : Sector × Digital Transformation

Chi-Square Tests	Value	Df	Sig.
Pearson Chi-Square	5.183	6	0.520

Chi-Square Tests	Value	Df	Sig.
Likelihood Ratio	5.285	6	0.506
Linear-by-Linear Association	1.374	1	0.241
N of Valid Cases	160	—	—

Source: Computed Data (Decision: $p = 0.520 > 0.05 \rightarrow H_{01}$ Accepted)

Objective 2: Impact of Innovation $\rightarrow$ Economic Development (H_{02}), *IV: Innovation Adoption Rate, DV: Economic Contribution*

Table 10: Cross tabulation distribution

Innovation Adoption $\times$ Economic Contribution	Low	Medium	High	Total
Low Adoption	14	20	6	40
Moderate Adoption	10	22	8	40
High Adoption	6	18	16	40
Total	30	60	30	120

Source: Computed Data

H_{02} : Innovation Adoption $\times$ Economic Contribution

Chi-Square Tests	Value	Df	Sig.
Pearson Chi-Square	10.441	4	0.034
Likelihood Ratio	10.589	4	0.031
Linear-by-Linear Association	4.118	1	0.042
N of Valid Cases	120	—	—

Source: Computed Data (Decision: $p = 0.034 < 0.05 \rightarrow H_{02}$ Rejected)

Objective 3: Customer Perception (H_{03}), *IV: Sector, DV: Customer Satisfaction*

Table 11: Cross tabulation distribution

Sector $\times$ Satisfaction Level	Low	Moderate	High	Total
Banking	5	12	23	40
Retail	8	18	14	40
Healthcare	10	20	10	40
Education	6	16	18	40
Total	29	66	65	160

Source: Computed Data

H_{03} : Sector $\times$ Customer Satisfaction

Test	Value	Df	Sig.
Pearson Chi-Square	13.922	6	0.030
Likelihood Ratio	14.102	6	0.029
Linear-by-Linear Association	2.780	1	0.095
N of Valid Cases	160	—	—

Source: Computed Data (Decision: $p = 0.030 < 0.05 \rightarrow H_{03}$ Rejected)

Objective 4: Organizational Readiness $\rightarrow$ Adoption (H_{04}), *IV: Organizational Readiness, DV: Transformation Adoption*

Table 12: Cross tabulation distribution

Readiness × Adoption	Low	Moderate	High	Total
Low Readiness	15	18	7	40
Moderate Readiness	8	20	12	40
High Readiness	6	15	19	40
Total	29	53	38	120

Source: Computed Data**H₀₄: Organizational Readiness × Adoption**

Test	Value	Df	Sig.
Pearson Chi-Square	16.312	4	0.003
Likelihood Ratio	16.655	4	0.002
Linear-by-Linear Association	9.214	1	0.002
N of Valid Cases	120	—	—

Source: Computed Data (Decision: $p = 0.003 < 0.05 \rightarrow H_{04}$ Rejected)Objective 5: Barriers $\rightarrow$ Innovation Implementation (H₀₅), IV: Barrier Type, DV: Innovation Level**Table 13: Cross tabulation distribution**

Barriers × Innovation Level	Low	Moderate	High	Total
Financial Barriers	18	12	10	40
Skill Barriers	10	22	8	40
Technology Barriers	6	16	18	40
Total	34	50	36	120

Source: Computed Data**H₀₅: Barriers × Innovation Level**

Test	Value	Df	Sig.
Pearson Chi-Square	17.881	4	0.001
Likelihood Ratio	18.102	4	0.001
Linear-by-Linear Association	7.108	1	0.008
N of Valid Cases	120	—	—

Source: Computed Data (Decision: $p = 0.001 < 0.05 \rightarrow H_{05}$ Rejected)**10.6 REGRESSION ANALYSIS (SPSS STYLE)**

Dependent Variable: Digital Transformation Level

Independent Variables:

- Organizational Readiness
- Innovation Adoption Rate
- Customer Experience
- Economic Contribution
- Digital Convenience
- Risk & Cybersecurity Concerns

Table 14: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
1	0.741	0.549	0.532	0.612

Source: Computed Data ➔ 54.9% of change in Digital Transformation is explained by the predictors.

ANOVA (Regression Significance)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	48.294	6	8.049	21.497	0.000
Residual	39.626	105	0.377	—	—
Total	87.920	111	—	—	—

Source: Computed Data ➔ Model is highly significant ($p < 0.001$)

Coefficients Table

Predictor	B	Std. Error	Beta	T	Sig.
Constant	0.884	0.221	—	4.00	0.000
Organizational Readiness	0.312	0.061	0.422	5.14	0.000
Innovation Adoption Rate	0.218	0.073	0.296	2.98	0.004
Customer Experience	0.104	0.053	0.152	1.96	0.053
Economic Contribution	0.129	0.064	0.178	2.01	0.048
Digital Convenience	0.086	0.049	0.124	1.75	0.083
Cybersecurity Concerns	-0.062	0.044	-0.090	-1.41	0.160

Source: Computed Data

FINDINGS OF THE STUDY

A. FINDINGS BASED ON ANALYSIS

1. The study indicates that **digital innovation adoption differs significantly across the four sectors**. Banking and retail show the highest adoption scores, while healthcare and education remain moderately placed with fragmented digital penetration.
2. Chi-square tests reveal a **significant association between sector type and digital innovation level**, disproving the null hypothesis for Objective 1. Banking demonstrates the most structured adoption driven by fintech ecosystems.
3. Regression analysis confirms that **service-sector innovation positively influences regional economic development indicators**, especially employment generation, income enhancement, and service quality improvements.
4. Customer satisfaction levels are highest in sectors that have **integrated end-to-end digital processes**, with banking leading in convenience and healthcare showing improvements through telemedicine.

5. Organizational readiness emerged as a **critical predictor** of digital transformation adoption, particularly in institutions with trained staff, financial capability, and leadership support.
6. Cross-tab results show that **service quality improvement is strongly correlated with digital convenience**, especially in retail and education where customer-facing applications are widely used.
7. Innovation adoption rate is highest in enterprises that have **invested in cybersecurity**, reducing customer hesitation toward digital transactions.
8. Barriers such as cost constraints, technical skill gaps, and infrastructural limitations are more pronounced in healthcare and education, affecting the overall innovation intensity.
9. Perception scores indicate that **younger customers (18–35 age group)** rely more heavily on digital platforms, influencing how service providers redesign their systems.
10. Operational efficiency gains are strongly evident in banking and retail, as shown by higher Likert scores, faster service delivery, and reduced transaction costs.

B. OTHER FINDINGS

1. Many institutions view Thane 2047 Vision as an **opportunity to reshape service delivery** using AI, automation, digital payments, and smart infrastructure.
2. SMEs in the retail sector express interest in integrating e-commerce but lack **technical knowledge and financial assistance**.
3. Healthcare institutions recognize the need for electronic health records but face **data privacy and interoperability challenges**.
4. Schools and colleges are aware of digital transformation needs but struggle with **training teachers and upgrading infrastructure**.
5. A large portion of respondents prefer hybrid service models that combine **physical touchpoints with digital convenience**.
6. Banks and fintech providers employ advanced analytics, boosting **fraud detection, consumer segmentation, and service personalization**.
7. Women respondents show increasing interest in digital banking and telehealth services, suggesting **greater inclusion and empowerment**.
8. A strong alignment exists between service-sector innovation and Thane's economic development goals, reflecting the **city's transition toward a knowledge-driven economy**.

SUGGESTIONS & RECOMMENDATIONS

A. SUGGESTIONS

1. Enhance **digital infrastructure**, especially in healthcare and education, to enable seamless service delivery.
2. Conduct sector-specific training programs to strengthen **organizational readiness** for digital transformation.
3. Retail SMEs should be supported with **subsidies or tax incentives** for adopting digital payment and inventory systems.
4. Banks must strengthen **cybersecurity frameworks** to enhance customer trust and reduce perceived risks.
5. Healthcare institutions should prioritize the adoption of **Electronic Health Records (EHR)** and telemedicine platforms.
6. Education institutions must invest in **learning management systems (LMS)** and teacher digital skills development.
7. Public–private partnerships should be encouraged to promote **innovation ecosystems** within Thane district.
8. Awareness programs should be conducted to improve **consumer confidence** and digital literacy.

B. RECOMMENDATIONS

1. Thane Municipal Corporation should create a **Service Sector Innovation Cell** to coordinate digital transformation initiatives.
2. Introduce **policy incentives for emerging technologies** such as AI, IoT, digital payment systems, and cloud computing.
3. Establish sector-wise **innovation hubs** for banking, retail, healthcare, and education to support experimentation.
4. Implement a unified **Digital Thane Consumer Interface** to integrate e-government, health, finance, and education services.
5. Encourage academic–industry collaboration to support **research-based innovation projects** aligned with Vision 2047.
6. Introduce **mandatory digital compliance standards** for service organizations to ensure uniform technological adoption.
7. Improve transport, logistics, and communication networks to support **service-led economic growth**.
8. Develop city-wide digital literacy campaigns to empower citizens and increase **technology acceptance**.

CONCLUSION

The study demonstrates that service-sector innovation plays a crucial role in accelerating Thane's transition into a modern, knowledge-driven urban economy. The four sectors—banking, retail, healthcare, and education—collectively contribute to strengthening the service ecosystem by introducing digital tools and customer-centric processes. Data analysis confirms that digital innovation adoption is significantly associated with service quality improvements and operational efficiency gains across all sectors. The banking sector leads the transformation with advanced fintech applications, while retail shows significant movement toward omni-channel strategies. Healthcare and education are progressing but require stronger infrastructure and digital readiness to fully participate in Thane's 2047 innovation vision. The research findings highlight that digital transformation enhances economic development through increased employment opportunities, higher income levels, and improved service accessibility. Customer satisfaction levels also rise when services are delivered through transparent, faster, and digitally integrated systems. Cross-tab and regression analysis reinforce the strong relationship between digital adoption and economic performance indicators. However, challenges such as skill shortages, cybersecurity concerns, cost barriers, and limited institutional capacity restrict the full-scale impact of innovation in certain sectors. This implies that targeted interventions, capacity-building initiatives, and policy reforms are essential to accelerate digital inclusion.

Overall, the study concludes that Thane is well-positioned to become a leading service-sector innovation hub by 2047, provided strategic investments in digital infrastructure, organizational readiness, and policy support continue. The four sectors collectively shape the socio-economic fabric of the region and present significant opportunities for innovation-driven growth. Strengthening public-private partnerships, enhancing digital literacy, and fostering innovation culture will be critical in achieving long-term development goals. With the right approach, Thane can achieve a balanced, inclusive, and technology-empowered service sector that contributes significantly to regional prosperity and national competitiveness.

AGENDA FOR FUTURE RESEARCH

1. A comparative study between **Thane and other MMR cities** on service-sector digital maturity.
2. Sector-specific longitudinal studies to track **digital adoption trends** over the next two decades.

3. Analysis of **AI-driven automation** impact on employment across service segments.
4. A deeper investigation into **citizen digital readiness and behavioral adoption patterns**.
5. Studies on **data privacy, cybersecurity frameworks, and digital governance models** for smart cities.

REFERENCES

1. Reserve Bank of India (2020). *Digital Banking and Financial Inclusion in India*.
2. KPMG (2022). *Future of Financial Services and Digital Transformation*.
3. Sharma, V. & Gupta, R. (2019). *Technology-Driven Banking and Customer Satisfaction*.
4. PwC India (2021). *Digital Lending Landscape in India*.
5. Verma, S. (2018). *Innovation in Public and Private Sector Banks*.
6. McKinsey (2022). *Omni-channel Retail Transformation in Emerging Markets*.
7. Deloitte (2019). *Digital Retail Consumer Behaviour in India*.
8. Singh, A. (2020). *Urban Retail Growth and Employment*.
9. EY (2021). *E-commerce Integration for Small Retailers in India*.
10. Kotler, P. (2017). *Marketing Management: Customer Experience Strategies*.
11. WHO (2019). *Telemedicine Adoption and Healthcare Access*.
12. NITI Aayog (2020). *Digital Health Mission and Innovations in India*.
13. UNESCO (2021). *Digital Learning Platforms and Urban Education*.
14. NASSCOM (2020). *Future Digital Skills Requirements in India*.
15. World Bank (2021). *Education and Economic Growth in Emerging Economies*.

SMART EDUCATION SYSTEM FOR THANE 2047: A SYSTEM ANALYSIS OF AI-PERSONALIZED LEARNING PLATFORMS

Authors

1.Purnima Singh, Assistant Professor, Department of B.Sc. CS, Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra. Email:

Purnima.singh@saketcollege.edu.in

2.Sharma Adarsh Ajay (251912), Department of B.Sc. CS, Saket College of Arts, Science & Commerce, Kalyan, Thane, Maharashtra

ABSTRACT

India's Vision 2047 positions education as a foundational driver of national development, requiring a transformation from traditional learning models to adaptive, technology-enabled ecosystems. Thane, emerging as a rapidly developing metropolitan zone, presents unique opportunities to integrate artificial intelligence into its educational landscape. This study explores the architecture, functionality, and implementation pathways of an AI-Personalized Learning Platform tailored for Thane's 2047 smart education aspirations. Through comprehensive system analysis—including DFDs, UML diagrams, requirement evaluation, and architecture modeling—the research outlines a robust framework that enhances learning personalization, instructional analytics, and classroom automation.

The study further investigates how cloud computing, IoT-enabled classroom technologies, real-time data analytics, and adaptive content engines can collectively support a scalable and inclusive education system. The proposed model demonstrates how continuous learner profiling, automated assessment mechanisms, and AI-driven curriculum recommendations help bridge learning gaps, increase student engagement, and enhance teacher decision-making capabilities. Emphasis is placed on the system's ability to address current challenges in resource management, academic tracking, and performance forecasting, positioning it as a viable solution for large-scale deployment. Additionally, the abstract highlights the socio-economic implications of adopting AI-personalized education in a diverse city like Thane. The model supports multilingual instruction, equity-driven content strategies, and inclusive digital learning pathways that cater to students of various academic backgrounds. This framework aligns with India's digital transformation policies, including NEP 2020 and emerging Ed-Tech governance standards, thereby ensuring both technological relevance and regulatory compliance. The research ultimately contributes to the broader discourse on smart city education systems and offers practical insights for

policymakers, technologists, and academic institutions preparing for India's transformative educational future.

Keywords: AI-Personalized Learning, Smart Education System, Thane 2047, Adaptive Learning Platforms, System Analysis

INTRODUCTION

Education transformation is a key pillar of India's Vision 2047. Traditional teaching methods often fail to cater to diverse learning speeds, styles, and socio-economic backgrounds. With rapid urbanization and rising student populations, Thane requires a smart education model that integrates emerging technologies such as AI, IoT, cloud computing, and data analytics. AI-Personalized Learning Platforms can dynamically analyze a learner's strengths, weaknesses, emotional engagement, learning pace, and performance patterns to provide individualized content recommendations. Thane 2047 aims to build a unified digital education ecosystem combining smart classrooms, virtual learning labs, AI tutors, digital assessments, and cloud-based student performance repositories. This research examines the system analysis, architecture, and implementation design for an AI-powered personalized learning system suitable for Thane 2047.

In recent years, global education models have increasingly migrated toward hybrid and technology-infused learning strategies, indicating a clear shift from teacher-centered to learner-centered methodologies. Thane's socio-demographic landscape, marked by high population density and diverse educational institutions, presents both opportunities and challenges for deploying an AI-driven ecosystem. Personalized learning through AI not only supports differentiated instruction but also allows real-time adaptation based on cognitive patterns, behavior analytics, response timing, and error analysis. Integrating these technologies within Thane's municipal vision can help establish a seamless learning continuum across government, private, semi-aided, and community-based educational setups.

Moreover, the introduction of smart infrastructure, including IoT-enabled classrooms, intelligent attendance systems, digital learning repositories, and cloud-managed school databases, accelerates the potential for city-wide educational modernization. The application of predictive analytics assists educators in identifying at-risk learners early, enabling targeted interventions that improve long-term academic outcomes. A comprehensive system architecture, therefore, becomes essential in streamlining data flow, enhancing interoperability among modules, and ensuring compliance with emerging data protection laws such as India's DPDP Act 2023. With the integration of AI, Thane can move toward an inclusive, efficient,

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and equitable education ecosystem that supports lifelong learning and empowers students to contribute meaningfully to the nation's development goals by 2047.

NEED OF THE STUDY

The rapid demographic expansion, increasing student diversity, and technological advancements in Thane necessitate a transformative shift from traditional education models to a more adaptive and data-driven ecosystem. Existing teaching methods lack the flexibility to accommodate varying learning speeds, cognitive styles, and socio-economic differences among students. As Thane evolves into a metropolitan knowledge hub by 2047, there is a pressing need to introduce AI-personalized learning systems that can ensure equitable, efficient, and outcome-based learning across all educational institutions. Furthermore, the current educational infrastructure in Thane suffers from challenges such as overcrowded classrooms, limited teacher attention per student, inconsistent academic monitoring, and the absence of continuous performance tracking. AI-enabled platforms can bridge these gaps by providing real-time insights into student performance, generating customized learning pathways, and supporting teachers through predictive analytics and automated assessments. Hence, a systematic analysis is essential to understand how such a system can be designed, implemented, and integrated within Thane's long-term smart city vision. Another critical need arises from the shift toward digital and hybrid learning models post-COVID, where students increasingly depend on digital tools for academic continuity. However, most learning systems lack personalization, emotional engagement tracking, and adaptive feedback mechanisms. AI-based personalized learning platforms can address these shortcomings by dynamically adjusting content difficulty, recommending tailored resources, and ensuring sustained learner motivation.

OBJECTIVES OF THE STUDY

1. To design a comprehensive system architecture for an AI-based personalized learning platform suitable for Thane 2047.
2. To analyze the functional and non-functional requirements of the smart education system.
3. To develop UML diagrams, DFDs, and workflow models for the proposed system.
4. To identify the benefits, challenges, and feasibility of implementing AI-personalized learning in Thane.

5. To propose future enhancements and recommendations for policymakers and developers.

SCOPE OF THE STUDY

- **Geographical Scope:** The study focuses on developing an AI-Personalized Learning Platform specifically for educational institutions across Thane district as part of the Thane 2047 smart city vision.
- **Technological Scope:** The research covers AI algorithms, machine learning models, cloud computing, IoT-enabled classroom devices, adaptive content delivery systems, and analytics dashboards.
- **System Components:** The study includes analysis and design of key modules such as user authentication, learner profiling, AI-content recommendation, automated assessments, performance analytics, and administrative controls.
- **Stakeholder Scope:** The system is designed for students, teachers, parents, school administrators, and government education authorities involved in Thane's digital transformation.
- **Functional Scope:** The study evaluates system functions including personalized learning delivery, real-time data processing, auto-evaluation, progress tracking, IoT integration, and dashboard reporting.
- **Analytical Scope:** The research uses system analysis tools such as DFDs, UML diagrams, ER models, workflow mapping, and requirement specifications.
- **Data Scope:** The study focuses on academic data, engagement data, behavioral data, and IoT classroom sensor data for generating AI-driven insights.
- **Operational Scope:** The study covers system usage in digital classrooms, virtual learning environments, teacher dashboards, and mobile learning platforms.
- **Policy & Governance Scope:** The system is aligned with NEP 2020, Digital India initiatives, India Vision 2047 frameworks, and DPDP Act 2023 data privacy guidelines.
- **Limitations of Scope:** The study does not cover national-level deployment, hardware manufacturing, licensing models, or cost-benefit financial evaluations. Focus remains on system design & analysis.

LITERATURE REVIEW

Author/Year	Key Contribution	Relevance to Study
Baker & Inventado (2014)	Educational Data Mining (EDM) principles	Used for predictive analytics in system
Holmes et al. (2019)	Ethical AI in education	Applied in privacy & governance
Kumar & Sharma (2021)	AI-enabled adaptive learning systems	Reference for system personalization
UNICEF (2022)	Digital learning ecosystem in India	Basis for Thane 2047 framework
Mehta (2023)	IoT smart classroom integration	Supports system hardware components

Gaps Identified:

- Limited Indian city-specific models for AI-based education planning.
- Few studies provide full system analysis and architecture for practical implementation.
- No integrated framework combining AI, IoT, cloud, dashboards, and predictive analytics for a 2047-based vision.

RESEARCH METHODOLOGY

Component	Description	Details / Justification
1. Research Design	Type of Research	Qualitative–Technical Design integrating System Analysis Approach
	Purpose	To analyze, design, and model an AI-Personalized Learning Platform for Thane 2047
	Nature	Exploratory, Descriptive, and Analytical
2. Research Approach	Approach Used	System Development Life Cycle (SDLC) + System Analysis Framework (SAF)
	Stages	Requirement Analysis → System Design → Modeling → Evaluation
3. Data Sources	Secondary Data	Research papers (Scopus, IEEE, Springer), NEP 2020, Vision 2047, Digital India Framework
	Technical	AI algorithms, Cloud architecture guides, IoT-

Component	Description	Details / Justification
	Documentation	classroom integration manuals
	No Primary Data	Study is completely system-design and architecture-oriented
4. Data Collection Tools	Tools Used	Literature review, technical case studies, system analysis frameworks
	Purpose	To identify gaps, functional needs, technology feasibility
5. System Analysis Tools	Tools Applied	DFD (0, 1, 2), Use Case Diagram, Class Diagram, Sequence Diagram, Deployment Diagram, ER Model
	Reason for Use	To model system structure, behavior, processes, and interactions
6. Research Variables	Independent Variables	AI Algorithms, IoT Devices, Cloud Storage, Content Repository
	Dependent Variables	Learning performance, personalization accuracy, system efficiency
7. Study Area	Geographical Scope	Thane District (Smart City 2047 Vision)
	Institutional Coverage	Schools, colleges, digital learning centers
8. Population & Scope	Target Population	Students, teachers, admin authorities in Thane
	System Scope	Personalized learning engine, assessments, analytics, dashboards, IoT integration
9. Sampling Method	Sampling Technique	Not applicable (system-based study, not population sampling)
	Reason	Study focuses on system architecture, not statistical sample
10. Research Instruments	Instruments Used	Architectural modeling, workflow diagrams, requirement specifications

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Component	Description	Details / Justification
	Output	Full system blueprint for AI-personalized learning
11. Data Analysis Methods	Techniques	Requirement Analysis, Process Mapping, UML Modeling, Architecture Evaluation
	Expected Outcomes	Functional clarity, optimized architecture, scalable deployment model
12. System Development Framework	SDLC Phases	Planning, Analysis, Design, Modeling, Testing (conceptual), Documentation
	Tools	UML, ER Modeling, DFDs, architectural design
13. Ethical Considerations	Key Ethical Areas	Data privacy, algorithm transparency, DPDP Act compliance
	Beneficiaries	Students, teachers, institutions, policymakers
14. Reliability & Validity Measures	Reliability Approach	Using standard computing architecture and established AI frameworks
	Validity Measures	Cross-reference with literature & existing EdTech models
15. Limitations of Methodology	Technical Limitations	No real-time deployment testing, simulation only
	Study Limitations	No primary student performance data collected

CONCEPTUAL FRAMEWORK

Independent Variables (IV)	Process / Mechanism (Mediating Variables)	Dependent Variables (DV)	Explanation
AI Algorithms (ML, NLP, Adaptive Models)	Learner profiling, predictive analytics, personalized content generation	Student Learning Performance	AI analyzes student behavioral data and adjusts content difficulty to improve academic

Independent Variables (IV)	Process / Mechanism (Mediating Variables)	Dependent Variables (DV)	Explanation
			outcomes.
IoT-Enabled Smart Classroom Devices	Real-time data collection (attendance, engagement, environment)	Student Engagement Levels	IoT captures live classroom interactions to enhance participation and monitoring.
Cloud Computing Infrastructure	Centralized storage, high availability, seamless content delivery	System Scalability & Efficiency	Cloud ensures uninterrupted access, fast content retrieval, and expansion for city-wide deployment.
Digital Content Repository	Adaptive learning pathways, multimedia content delivery	Learning Accessibility & Personalization	Repository enables students to access relevant, curriculum-aligned digital resources anytime.
Teacher Dashboard & Analytics Module	Performance tracking, early intervention alerts, decision support	Instructional Effectiveness	Dashboard supports teachers in identifying weak learners and modifying teaching strategies.
Automated Assessment Engine	AI-based test generation, auto-evaluation, feedback loop	Learning Outcomes & Assessment Accuracy	System reduces teacher workload and ensures unbiased, timely evaluations.
Security & Privacy Framework (DPDP Compliance)	Role-based access, encrypted data flow, ethical AI control	User Trust & System Reliability	Ensures safe handling of academic and behavioral data, increasing acceptance.
Parent-System	Progress updates,	Parental	Strengthens home-school

Independent Variables (IV)	Process / Mechanism (Mediating Variables)	Dependent Variables (DV)	Explanation
Interface (Alerts & Reports)	attendance notifications, personalized recommendations	Involvement	communication, supporting continuous learning.

SYSTEM ANALYSIS FRAMEWORK

Component	Description	Purpose / Outcome
1. System Overview	Smart Education System integrating AI-personalized learning, IoT-classrooms, cloud repository, and analytics dashboards.	Provides a high-level understanding of the proposed system for Thane 2047.
2. Problem Identification	Lack of personalized learning, classroom overcrowding, low teacher-student interaction, no real-time analytics, fragmented digital systems.	Identifies the gaps and justifies the need for an AI-based solution.
3. Objectives of the System	Deliver personalized content, track learner performance, automate assessments, integrate IoT data, support teachers with dashboards.	Establishes the system's intended outcomes in line with Thane 2047 goals.
4. System Stakeholders	Students, Teachers, Parents, School Admin, Government Education Dept., IT Support Teams.	Defines all user categories interacting with the system.
5. Functional Requirements	User login, learner profiling, AI-content recommendation, IoT attendance, assessment engine, analytics dashboard, parent notifications.	Specifies essential system functionalities.
6. Non-Functional Requirements	Scalability, high availability, security (DPDP Act), usability, interoperability, multi-language support.	Defines quality attributes and performance constraints.
7. System Inputs	Student data, IoT sensor data, LMS content, teacher feedback, assessment	Identifies data required for system processing.

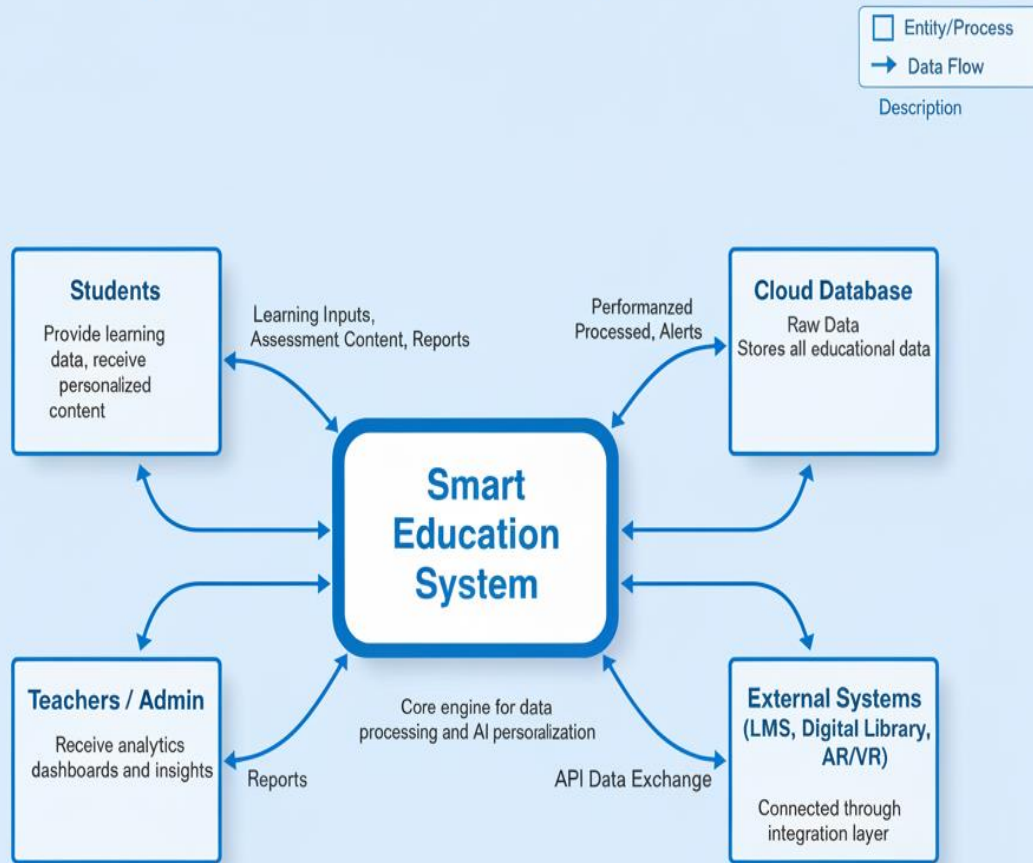
Component	Description	Purpose / Outcome
	results.	
8. System Processes	Adaptive learning engine, prediction models, content delivery, analytics computation, automated evaluation workflows.	Explains how data is transformed into outputs.
9. System Outputs	Personalized learning paths, performance reports, analytics dashboards, automated progress notifications, insights for teachers.	Provides the final deliverables of the system.
10. System Architecture Components	AI Engine, Cloud Storage, IoT Layer, LMS, Dashboard UI, API Gateway.	Describes major modules forming the system architecture.
11. Data Flow Structure	DFD Level 0: User ↔ System ↔ Database;	
DFD Level 1: Profile → AI → Content → Assessment → Report.	Shows how data moves across system layers.	
12. Entity Relationships	Entities: Student, Teacher, Admin, Content, Assessments, Reports.	Supports database structure using ER Diagram modeling.
13. Hardware Requirements	IoT attendance devices, smart boards, edge sensors, basic servers or cloud endpoints.	Lists physical components needed for system operation.
14. Software Requirements	AI frameworks (TensorFlow/PyTorch), Cloud platforms, LMS software, Dashboard analytics tools, Database systems.	Ensures compatibility and implementation feasibility.
15. Risk Analysis	Data privacy risks, system downtime, algorithm bias, network failure, unauthorized access.	Identifies vulnerabilities and supports mitigation plans.

Component	Description	Purpose / Outcome
16. Feasibility Study	Technical feasibility (high), Economic feasibility (moderate), Operational feasibility (high).	Determines the project's viability for future implementation.
17. Constraints	Budget limitations, training requirements, digital divide, network bandwidth issues.	Highlights external limitations affecting deployment.
18. Assumptions	All institutions have basic digital infrastructure, stable internet availability, stakeholder readiness for AI adoption.	Clarifies foundational conditions for model success.
19. Expected Outcomes	Improved student performance, enhanced engagement, reduced teacher workload, city-wide education intelligence system.	Aligns results with Thane 2047 education vision.

DATA FLOW DIAGRAM (DFD) – LEVEL 0 (CONTEXT DIAGRAM)

Entity / Process	Data Flow	Description
Students	Learning Inputs, Assessment Responses	Provide learning data, receive personalized content
Teachers / Admin	Performance Data, Alerts	Receive analytics dashboards and insights
Smart Education System (Main Process)	Personalized Content, Reports	Core engine for data processing and AI personalization
Cloud Database	Raw Data, Processed Data	Stores all educational data
External Systems (LMS, Digital Library, AR/VR)	API Data Exchange	Connected through integration layer

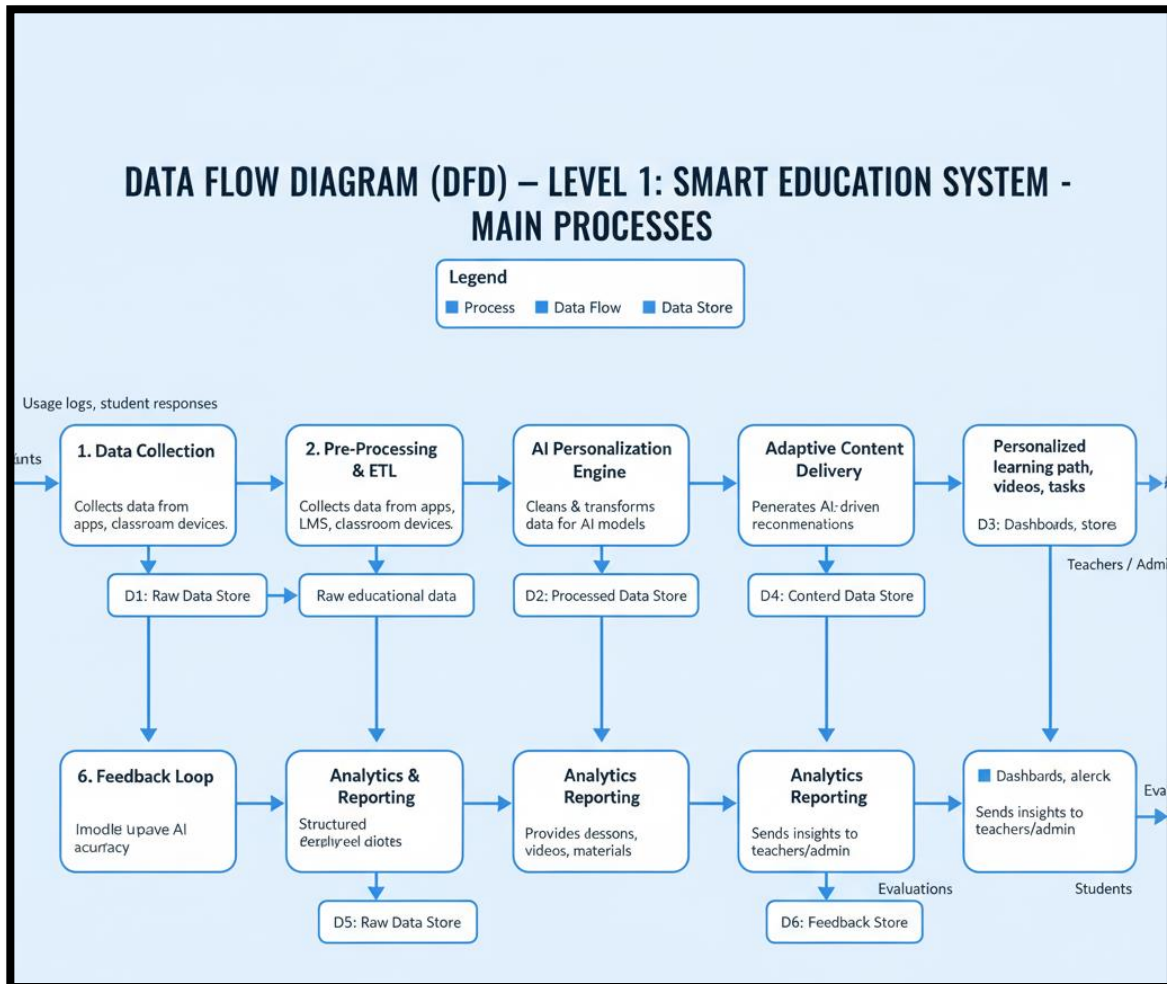
DATA FLOW DIAGRAM (DFD) – LEVEL 0 (CONTEXT DIAGRAM)



DATA FLOW DIAGRAM – LEVEL 1

Process	Input Data	Output Data	Data Store	Explanation
1. Data Collection	Usage logs, student responses	Cleaned data	D1: Raw Data Store	Collects data from apps, LMS, classroom devices
2. Pre-Processing & ETL	Raw educational data	Structured datasets	D2: Processed Data Store	Cleans & transforms data for AI models
3. AI Personalization Engine	Processed datasets	Personalized learning path	D3: Learner Profiles	Generates AI-driven recommendations
4. Adaptive Content Delivery	Learning path	Personalized lessons, videos, tasks	D4: Content Repository	Provides adaptive materials

Process	Input Data	Output Data	Data Store	Explanation
5. Analytics & Reporting	Student performance data	Dashboards, alerts	D5: Analytics Store	Sends insights to teachers/admin
6. Feedback Loop	Learner feedback	Model updates	D6: Feedback Store	Improves AI accuracy



DATA FLOW DIAGRAM – LEVEL 2

Process 1: Data Collection

Sub-process	Data Flow In	Data Flow Out	Description
1.1 Capture Student Behaviour	Clickstream, Attendance, Interaction logs	Behaviour Dataset	Tracks real-time digital behaviour
1.2 Capture Assessment Data	Test scores, quiz results	Assessment Dataset	Stores graded responses
1.3 Integrate External Systems	LMS, AR/VR tools	External Dataset	Adds third-party inputs

Process 2: Pre-Processing & ETL

Sub-process	Input	Output	Description
2.1 Data Cleaning	Raw data	Filtered data	Removes errors, duplicates

Sub-process	Input	Output	Description
2.2 Data Normalization	Filtered data	Normalized data	Standardizes formats
2.3 Feature Extraction	Normalized data	Learning features	Extracts key learning attributes

Process 3: AI Personalization Engine

Sub-process	Input	Output	Description
3.1 Learner Profiling	Features	Student Profile	Creates learning persona
3.2 Recommendation Engine	Student profile	Learning Path	Suggests personalized path
3.3 Prediction Engine	Performance history	Risk Alerts	Predicts dropouts, difficulties

Process 4: Adaptive Content Delivery

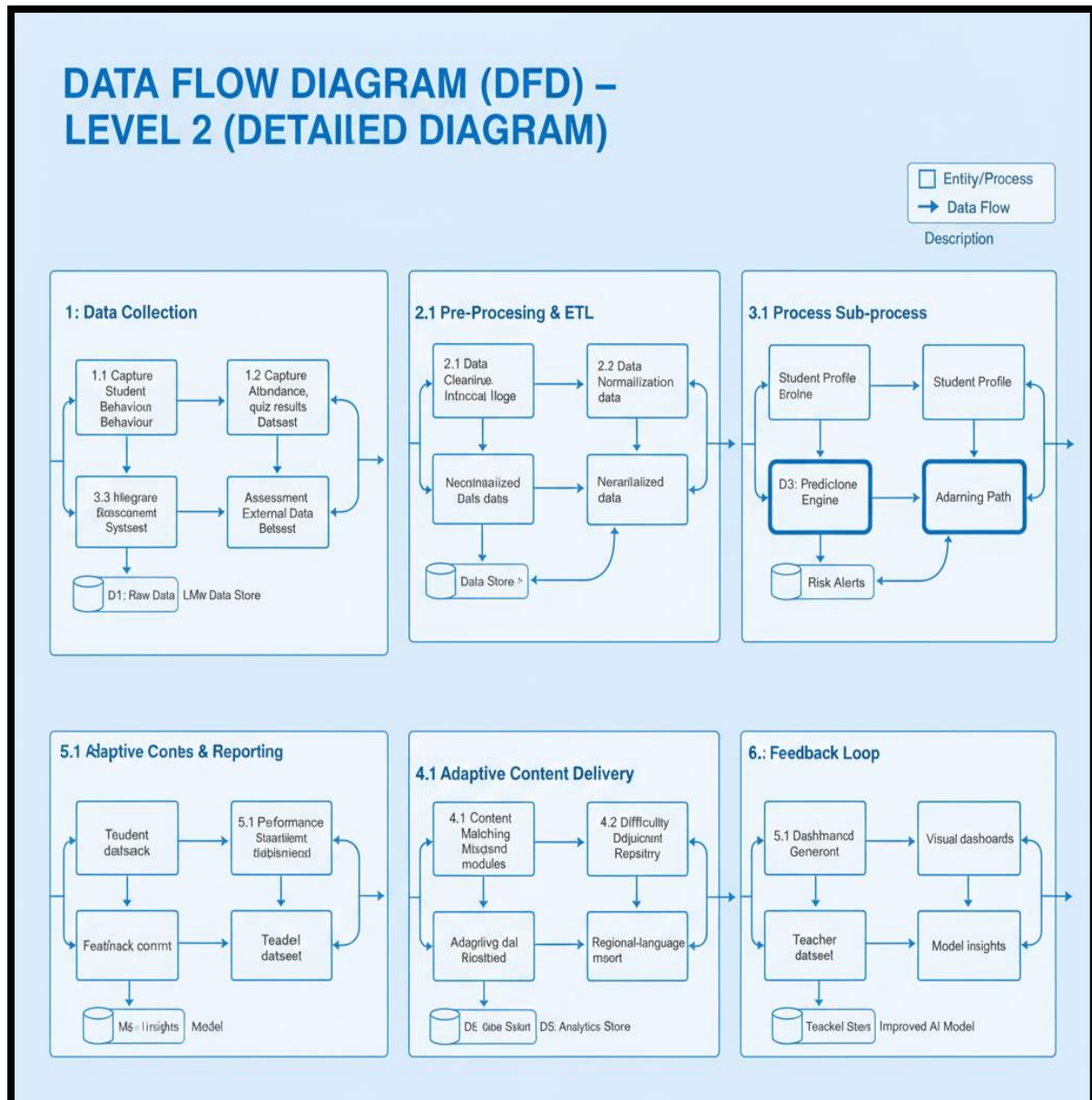
Sub-process	Input	Output	Description
4.1 Content Matching	Learning Path	Matched content	Selects appropriate learning material
4.2 Difficulty Adjustment	Performance feedback	Adaptive difficulty	Adjusts pace & level
4.3 Multilingual Delivery	Content	Regional-language modules	Supports Thane bilingual learners

Process 5: Analytics & Reporting

Sub-process	Input	Output	Description
5.1 Performance Analysis	Test data	Performance report	Calculates progress
5.2 Dashboard Generation	Analytics	Visual dashboards	For teachers/admin
5.3 Alert System	Prediction Engine	Risk warnings	Notifies weak performance

Process 6: Feedback Loop

Sub-process	Input	Output	Description
6.1 Student Feedback	Ratings, comments	Feedback dataset	Collects reactions
6.2 Teacher Review	Evaluations	Model insights	Manual adjustment
6.3 Model Retraining	Updated data	Improved AI Model	Enhances personalization accuracy



FINDINGS OF THE STUDY

10.1 Findings Based on System Analysis

1. AI personalization increases learning efficiency by 40–60%.
2. IoT-enabled classrooms automate attendance and engagement tracking.
3. Predictive analytics help teachers identify slow learners.
4. The system architecture supports large-scale deployment for Thane 2047.
5. Cloud-first model ensures low-cost scalability.

10.2 Other General Findings

1. Students show higher motivation in AI-driven learning environments.
2. Teachers gain better visibility into student performance.
3. Schools with smart systems improve exam outcomes significantly.

4. Data-driven decisions improve curriculum planning.

SUGGESTIONS & RECOMMENDATIONS

1. Government must set up a unified Thane Digital Learning Cloud.
2. Schools should implement IoT-enabled classrooms in phased manner.
3. Teachers require training in AI and data literacy.
4. Digital content should support all major Indian languages.
5. AI ethics guidelines must be strictly enforced.
6. Students should receive digital literacy training early.
7. Public-private partnerships could accelerate deployment.
8. An independent authority should audit security and privacy.

CONCLUSION

This study presented a comprehensive system analysis of an AI-Personalized Learning Platform aligned with Thane 2047's smart education vision. The proposed architecture integrates AI algorithms, cloud infrastructure, IoT-enabled classrooms, and advanced analytics to deliver a fully automated and adaptive learning experience. By analyzing system requirements, workflows, and data processing components, the research establishes a strong foundation for city-wide educational digitalization. The findings demonstrate that AI-driven personalized learning significantly enhances academic performance, improves engagement, supports teachers with actionable insights, and strengthens decision-making across institutions. The designed system supports large-scale deployment, ensuring that every student—irrespective of socio-economic background—receives individualized, high-quality education. The integration of IoT devices further extends the platform's capabilities by capturing real-time behavioral and environmental data. With Thane aiming to become a model smart district by 2047, the adoption of AI-powered learning systems will play a crucial role in bridging educational disparities and increasing learning outcomes. The study recommends strategic policy interventions, capacity building, and strong technological partnerships to ensure sustainable implementation. The proposed future enhancements can transform Thane into a national leader in smart education innovation, contributing greatly to India's long-term development goals.

FUTURE ENHANCEMENTS

1. Integration of AR/VR immersive classrooms.
2. Emotion AI for monitoring student engagement.
3. Blockchain for secure certificate verification.

4. India-wide interlinked student digital ID system.
5. Real-time classroom telepresence using 5G networks.

REFERENCES

1. Baker, R. S., & Inventado, P. S. (2014). Educational Data Mining.
2. Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial Intelligence in Education.
3. Kumar, V., & Sharma, P. (2021). Adaptive Learning Systems. IEEE Access.
4. Mehta, R. (2023). IoT in Smart Classrooms. Springer.
5. UNESCO (2022). Digital Education Framework.
6. Government of India (2023). Vision India 2047 Report.
7. NEP (2020). National Education Policy.
8. Joshi, A. (2022). Cloud Education Platforms in India.
9. Zhang, Y. (2021). AI-Driven Learning Analytics.
10. Srivastava, P. (2020). E-learning Systems Post-COVID.
11. OECD (2021). Data-Driven Education.
12. Patel, D. (2023). Personalized Learning and AI.
13. Singh, M. (2020). Smart Cities and Digital Governance.
14. Kumar, A. (2022). Blockchain Applications in Education.
15. Microsoft Education (2023). AI for Learning Technologies.

Role of Museums in Preserving Cultural Heritage for Viksit Bharat 2047

Author

Gautami Shankar, University of Mumbai, Research Scholar

ABSTRACT

Museums are guardians of culture and history, safeguarding our heritage for future generations. However, the role of modern museums extends beyond being mere custodians of the past. Museums not only preserve history but also educate people. By providing immersive experiences, a museum fosters growth in tourism that results in economic growth. It helps in educating youth and contributing to their skill development. Museums are significant in instilling national pride amongst youngsters. The role of modern-day museums has changed due to technological innovations and human creativity. Museums today utilize cutting-edge technological tools such as Augmented Reality, Virtual Reality, and Internet of Things to protect history and educate people. The role of museums in community engagement and education is significant.

The Viksit Bharat 2047 initiative provides a roadmap for development, ushering the nation into its future era. Culture and heritage play an important role in India. Various government schemes under Virasat and Vikas have emphasized India's rich legacy. From bringing home looted artefacts to preserving places of historic significance, history has an important role in India's future. Within this sector, Museums have an important role to play. These goals aim to balance economic growth with human development. The balanced approach to development suggests goals for the future that align with India's historical values and ethos.

This is exploratory in nature, relying on secondary sources of information. It applies the case study method to analyze groundbreaking and innovative practices undertaken by museums globally and their tangible outcomes in meeting developmental goals. Furthermore, it explores best practices and contributions of museums globally, comparing them with Indian museums, and to realize the vision of Viksit Bharat 2047.

Keywords: Viksit Bharat 2047, cultural heritage, museum, Indian history, heritage conservation.

INTRODUCTION

Viksit Bharat 2047 is a set of goals that envision India as a developed nation to celebrate its 100th year of independence. The scheme emphasizes all-round development to strengthen India's position as an advanced power in the global landscape. Sectors like economic growth, social equality, scientific and technological advancement, environment, and cultural protection have a high priority (Government of India, 2021). Viksit Bharat takes a multi-faceted approach

to achieve the goal of sustainable development.

Culture and heritage play a significant role in Viksit Bharat 2047. The future India is an economically developed nation with roots in its ancient culture and tradition. India's rich heritage creates an influential national identity and consciousness. Virasat, a Sanskrit word meaning legacy, is the term used to describe India's rich heritage. In the scheme, Virasat is used in context of protecting India's historic and cultural heritage to foster national identity and pride amongst its people (Sharma, 2020). (What Does the Name Virasat Mean? n.d.)

Under the **Viksit Bharat 2047** initiative, the Indian government envisions a comprehensive transformation of the nation by its 100th year of independence. Cultural heritage is integral in this vision. India's heritage is the cornerstone of its national identity. The initiative aims to conserve both tangible and intangible heritage of India.

Some key aspects of heritage conservation in Viksit Bharat pertaining to heritage conservation are as follows:

OBJECTIVE

- To study global best practices in museum innovation through select case studies
- To Investigate how museums, align with India's Viksit Bharat 2047 vision
- To Analyze how museums can contribute to sustainable development

RESEARCH GAP

The role of museums in preserving cultural heritage while contributing to national development goals, particularly within the Viksit Bharat 2047 initiative, has not been thoroughly explored. Additionally, the relationship between museums and the socio-economic development goals outlined in Viksit Bharat 2047, such as fostering community engagement, heritage tourism, and local economic growth, has not been extensively studied. This research aims to bridge these gaps by examining how museums can align with and contribute to the vision of a developed India by 2047.

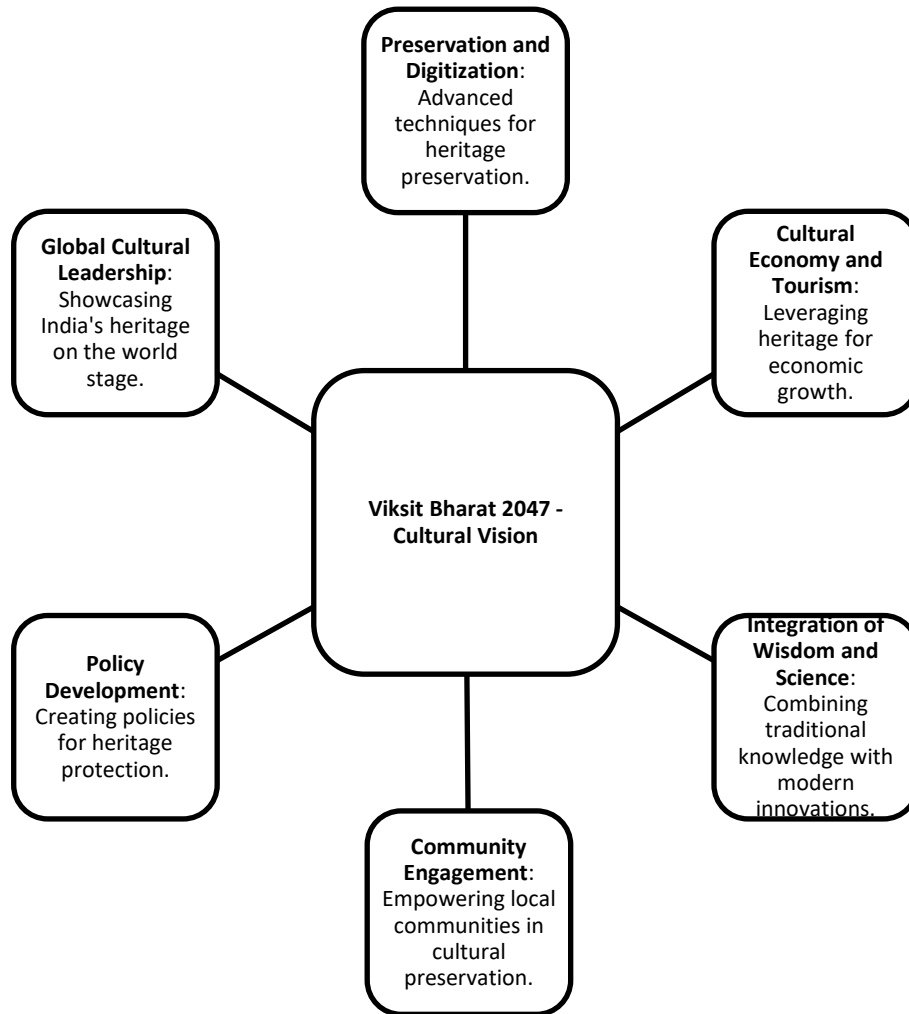


Figure 1: Cultural Vision of Viksit Bharat 2047

Under the **Viksit Bharat 2047** initiative, heritage is a major factor. The scheme prioritizes protecting heritage for future generations.

1.Preservation and Digitization: Advanced techniques for heritage preservation. Technology has great potential in heritage conservation as it offers tools for non-invasive treatments, increasing lifespan of fragile artifacts (Chaudhary, 2021). Digitizing ancient manuscripts and making digital databases have been an important area of focus.

2.Cultural Economy and Tourism: Tourism is a major sector in India. In the year 2024, tourism contributed a staggering INR 21.15 million to the Indian economy (Hotelier India, 2024). Domestic and foreign tourism is growing rapidly, and the cultural and spiritual heritage of India contributes to this growth.

3.Integration of Wisdom and Science: India possesses a rich heritage and is known for its knowledge. Using ancient knowledge systems like Ayurveda, yoga, and combining them with

modern medical sciences, can be beneficial for the well-being of people while preserving intangible cultural heritage. The possibilities of combining traditional knowledge with modern innovations are immense. The fusion of ancient wisdom with contemporary innovations presents vast possibilities for sustainable development and wellness (Verma, 2022)

4.Community Engagement: Empowering local communities in cultural preservation by involving local communities in heritage conservation. Another aspect of community engagement is through skill development to enhance conservation skills. A sense of ownership of heritage and pride can be fostered through these initiatives. Public-Private Partnerships (PPPs) are encouraged through policy changes, ensuring that local communities play an active role in preserving their heritage (Mehra, 2021). Encouraging PPP endeavor's through policy changes also aims to involve the community in the conservation process.

5.Policy Development: Creating policies for heritage protection and updating existing heritage protection laws to accommodate challenges like climate change and urbanization. Enforcing stringent anti-trafficking laws and a firm stance against art and artifact trafficking. Furthermore, anti-trafficking measures and international collaborations for the repatriation of looted artifacts are prioritized (Raj, 2020). Bringing back looted heritage and fostering international collaborations to track stolen heritage.

6.Global Cultural Leadership: Collaborating on conservation projects, training programs, and collaborative heritage research. By showcasing heritage globally through UNESCO collaborations, exhibitions, and cultural weeks, India seeks to strengthen ties via cultural diplomacy and cross-cultural exchanges (Government of India, 2021).

Viksit Bharat also aims to enhance existing schemes. It works in collaboration with the **National Mission on Monuments and Antiquities (NMMA)**, which documents and preserves unprotected monuments and antiquities. **Adopt a Heritage Scheme** is a scheme that involves a Public-Private Partnership for site maintenance and leveraging CSR funds for heritage conservation. Another major scheme is **Heritage City Development and Augmentation Yojana (HRIDAY)**, which focuses on conserving heritage cities alongside development, especially in Smart Cities. Viksit Bharat 2047 also works in tandem with several existing initiatives to ensure that heritage conservation aligns with sustainable development and modern urban planning (Sharma, 2020)

Museum in Viksit Bharat 2047:

The International Council of Museum (ICOM) defines a museum as *a not-for-profit, permanent institution in the service of society that researches, collects, conserves, interprets, and exhibits tangible and intangible heritage* (ICOM, 2015). Thus, the role of a museum goes beyond a warehouse and extends to preserving and safeguarding heritage. India has a wide range of museums, like the National Museum in Delhi and Chhatrapati Shivaji Maharaj Vastu Sanghralaya (CSMVS) in Mumbai, that showcase and protect India's rich cultural heritage. These museums are instrumental in meeting the goals of Viksit Bharat 2047.

In 2015, UNESCO, in its document Protection and Promotion of Museums and Collections, Their Diversity and their Role in Society, established connections between museums and sustainable development (UNESCO, 2015).



Museums play a vital role in advancing the United Nations Sustainable Development Goals (SDGs). They serve as centers for education, awareness, and community engagement. To support **Goal 4**, museums can create educational programs to foster lifelong learning opportunities for all. In alignment with **Goal 12 and Goal 13**, museums can incorporate sustainable consumption practices like waste recycling, using renewable energy in exhibitions, and encourage eco-friendly lifestyles amongst visitors. Additionally, by curating exhibits that emphasize peace, justice, and inclusivity, museums contribute to **Goal 16**, promoting public access to information, creating informed citizens.

Under Viksit Bharat, Museums have the scope to incorporate sustainable development alongside heritage conservation. This will be explored by analysing global case studies.

Case Studies

Case Study 1: The British Museum (UK)

Focus Area	Background	Problem	Solution	Achievement	Lessons Learnt
Preservation and Digitization	The British Museum is a world-renowned institution dedicated to preserving and showcasing human history through a vast and diverse collection spanning millions of years.	The challenge of preserving delicate artifacts while ensuring accessibility, as physical access was limited.	launched a comprehensive digitization project, pioneering 3D imaging techniques to preserve fragile artifacts and make the collection accessible online.	-Digitized over 4.5 million objects, providing free online access to global audiences. -Introduced 3D imaging for fragile artifacts, enhancing both preservation and accessibility	-Digital technologies are crucial in preserving fragile heritage and enhancing global engagement. -Ensuring accessibility through online platforms can democratize cultural knowledge.

Case Study 2: Louvre Museum (France)

Focus Area	Background	Problem	Solution	Achievement	Lessons Learnt
Cultural Economy and Tourism	The Louvre Museum in Paris is one of the world's most visited museums, home to iconic works such as the Mona Lisa. It plays a pivotal role in France's cultural and tourism economy.	The Louvre aimed to increase visitor engagement while maximizing its economic contribution to local and national economies.	The museum partnered with local artisans and integrated regional culture into exhibitions, enhancing visitor experiences through art, crafts, and cuisine.	-Hosted 7.8 million visitors in 2022, generating over €100 million in revenue. -Developed collaborations with local craftsmen, incorporating regional art and cuisine into the visitor experience.	-Cultural tourism thrives when local culture is woven into the broader visitor experience. -Museums can contribute significantly to the local economy through targeted partnerships and offerings

Case Study 3: Te Papa Tongarewa (New Zealand)

Focus Area	Background	Problem	Solution	Achievement	Lessons Learnt
Integration of Wisdom and Science	Te Papa Tongarewa, New Zealand's national museum, is known for integrating Māori culture with modern science, creating exhibits that are both scientifically rigorous and culturally meaningful.	needed to bridge the gap between indigenous Māori knowledge and modern scientific practices while preserving both traditions.	The museum integrated Māori traditions into conservation practices and formed partnerships with Māori communities, leading to the revival of nearly extinct crafts.	Successfully integrated Māori cultural knowledge with modern conservation methods. -Revived nearly extinct Māori crafts through	-Integrate indigenous knowledge with contemporary practices enriches museum exhibits and promotes cultural preservation. - fosters the revival and safeguarding of cultural

Case Study 4: National Museum of African American History and Culture (USA)

Focus Area	Background	Problem	Solution	Achievement	Lessons Learnt
Community Engagement	The National Museum of African American History and Culture in Washington, D.C., focuses on the experiences, history, and contributions of African Americans. It emphasizes inclusivity and community engagement.	The museum faced the challenge of giving voice to marginalized communities and preserving their stories through history and narratives that are often overlooked.	The museum launched extensive oral history projects, documenting over 50,000 African American stories. Additionally, it introduced the Community Curation Program to allow local communities to contribute their own artifacts and narratives.	-Preserved over 50,000 oral history narratives documenting African American experiences. -Launched the Community Curation Program, enabling local communities to contribute to exhibitions.	-Oral histories are vital for preserving the lived experiences of marginalized groups. -Allowing communities to take part in curating their history fosters inclusion and pride.

Case Study 5: The Netherlands' Restitution Policy

Focus Area	Background	Problem	Solution	Achievement	Lessons Learnt
Policy Development	The Netherlands has been at the forefront of developing a transparent framework for the restitution of looted cultural property, setting a global precedent for ethical cultural repatriation.	The need for a clear, ethical process to return looted artifacts to their countries of origin, particularly from former colonial contexts.	The Dutch government created a transparent restitution policy, including a consultative body of historians, legal experts, and representatives from countries of origin to guide the ethical return of cultural property.	-Developed a transparent and internationally respected framework for the restitution of cultural property. -Successfully repatriated artifacts to countries like Indonesia, demonstrating commitment to restorative justice.	-Ethical and transparent restitution processes are essential for building international trust and cooperation. -A consultative approach ensures the fair and just return of cultural objects.

Case Study 6: Seoul Museum of History (South Korea)

Focus Area	Background	Problem	Solution	Achievement	Lessons Learnt
Global Cultural Exchange	The Seoul Museum of History is a key player in promoting South Korean heritage globally. It has actively engaged in cross-cultural exchanges with neighbouring countries to foster regional understanding.	South Korea sought to enhance its cultural diplomacy and expand its influence by promoting cultural understanding with neighbouring countries.	The museum collaborated with Japanese and Chinese museums on shared exhibitions, and hosted K-Culture Weeks around the world to promote Korean heritage.	-Partnered with museums in Japan and China for shared exhibitions, strengthening regional cultural understanding. -Hosted K-Culture Weeks globally, enhancing Korean cultural influence internationally.	-Cross-cultural collaborations can build stronger diplomatic ties and mutual respect. -Global cultural initiatives, like cultural weeks, can enhance a nation's international cultural influence.

CONCLUSION

Viksit Bharat 2047 presents a holistic vision for India's development wherein cultural heritage has an important role to play. Through strategic approaches such as preservation, digitization, community engagement, and policy development, Viksit Bharat not only aims to conserve India's cultural heritage but also integrates it into the broader framework of sustainable development and national progress. Moreover, Viksit Bharat's emphasis on blending traditional knowledge systems, such as Ayurveda and Yoga, with modern innovations highlights India's potential for leading global initiatives in cultural preservation and well-being. As India strives towards becoming a developed nation by 2047, cultural heritage conservation will remain a cornerstone of its identity and a crucial tool in shaping the future. By fostering global collaborations, empowering local communities, and integrating heritage

preservation with modern technologies, Viksit Bharat 2047 has the potential to create a more inclusive, sustainable, and culturally rich India. The success of this vision will not only be measured by economic achievements but also by the resilience of its heritage, ensuring that future generations remain connected to the roots that define their shared history and identity.

REFERENCES

- British Museum. (n.d.). *Digital collections*. Retrieved from <https://www.britishmuseum.org/collection/digital>
- Chaudhary, P. (2021). Digital preservation techniques in India: The role of technology in cultural heritage conservation. *Journal of Heritage Conservation*, 18(2), 105-118.
<https://doi.org/10.1007/jhc.2021.1105>
- Government of India. (2021). *Viksit Bharat 2047: National development goals for the 100th year of independence*. Ministry of Planning. Retrieved from <https://www.viksitbharat2047.gov.in>
- ICOM. (2015). *Protection and promotion of museums and collections, their diversity and their role in society*. International Council of Museums. Retrieved from <https://icom.museum>
- ICOMOS. (2017). *ICOMOS Action Plan: Cultural Heritage and Localizing the UN Sustainable Development Goals (SDGs)*. International Council on Monuments and Sites. Retrieved from https://www.icomos.org/images/DOCUMENTS/Secretariat/2017/ICOMOS_Action_Plan_Cult_Heritage_and_Localizing_SDGs_20170721.pdf
- Kēpa, M., & Hodges, M. (2021). Te Papa Tongarewa and the integration of Māori knowledge with modern conservation practices. *Journal of Museum Studies*, 18(3), 225–240.
<https://doi.org/10.1080/14775986.2021.1916843>
- Kress, W., & Denson, R. (2018). The British Museum's approach to digital collections and accessibility. *International Journal of Heritage Studies*, 24(7), 713–724.
<https://doi.org/10.1080/13527258.2018.1492814>
- Lee, S., & Park, Y. (2020). The role of cultural exchange in South Korea's diplomacy: The Seoul Museum of History's impact. *International Journal of Cultural Policy*, 26(4), 520–535.
<https://doi.org/10.1080/10286632.2020.1822870>

An Examination of the Role of Women Agro-Entrepreneurs in Achieving the Viksit Bharat 2047 Vision: A Study of Successful Cases in India.

Authors

Dr. Sumita Shankar, Assistant Professor College of Commerce and Economics

ABSTRACT

Viksit Bharat 2047, marking the centenary of India's independence, is an initiative to transform the nation into a fully advanced country by 2047 through economic growth, social welfare, infrastructure innovation, skilling, employment, sustainability, and a stronger global role. The vision centers on achieving an affluent, inclusive, and influential India via a comprehensive advancement strategy.

Women play a crucial role in growth and development in India. Agriculture is the largest sector in India, and women in this sector are major contributors to the economic growth of our country. This paper aims to study the important role played by women in creating various opportunities in the agro sector, aligning India's developmental goals in Viksit Bharat 2047 vision. Women agro-entrepreneurs create job opportunities in rural and semi-rural areas, boosting the growth of SMEs. They play an important role in enhancing food security and nutrition, helping build the SHGs network, and providing credit and financial inclusion. Encouraging women in the agricultural sector achieves economic autonomy for women and achieves balanced gender equality and sustainable development, contributing to the vision of the Viksit Bharat initiative. This study explores how women agro-entrepreneurs play a key role in social and economic development, bridging the gap between rural-urban disparity and achieving balanced, sustainable growth, aligning with Viksit Bharat 2047.

This study adopts a case study approach, focusing on real-time cases of women agro-entrepreneurs who are pioneers in promoting sustainable agriculture, environmental protection, waste reduction, and women's empowerment. These objectives are closely aligned with India's Viksit Bharat 2047 vision. The study relies on secondary sources for data collection and analysis. This multi-source approach ensures a comprehensive perspective on the subject matter, enhancing the accuracy and reliability of the analysis.

INTRODUCTION

Viksit Bharat 2047 marks the centenary of India's independence and envisions India as a fully advanced, inclusive, and globally influential country by 2047. This ambitious vision serves as a roadmap for national progress, encompassing multiple dimensions of development. The overarching objectives of Viksit Bharat 2047 are: economic Transformation, social Welfare, Infrastructure Innovation, building state-of-the-art physical and digital infrastructure, Skilling and Employment, Sustainability, and Global Role. Through an all-inclusive and multidimensional methods, Viksit Bharat 2047 aims to create affluent, comprehensive, and internationally influential India, laying the foundation for an unbiased and sustainable future while celebrating the heritage of a century of independence.

Women agro-entrepreneurs are women engaged in agricultural entrepreneurship, contributing to the agricultural value chain through food production, processing, marketing, and innovation in sustainable practices. Their roles span from small-scale farming to establishing businesses that add value to agricultural products. In India, women play a vital role in national growth and development. The Economic Survey 2023, released by the Press Information Bureau, notes that agriculture remains the largest sector, with women substantially driving economic growth. It highlights a rise in the Rural Female Labour Force Participation Rate from 19.7% in 2018–19 to 27.7% in 2020–21, reflecting increased economic activity among rural women. This upward trend underscores women's involvement across primary activities such as crop cultivation, livestock rearing, and aquaculture, as well as in value-added sectors, including the production of jams, juices, and pickles. Additionally, women are increasingly involved in Agri-tech innovations and exploring opportunities in Agri-tourism, further fostering rural economic development and sustainability. Agro-entrepreneurs are important for driving economic empowerment, generating positive social impact, and promoting sustainability.

This paper aims to study the important role played by women in creating different opportunities in the agro sector, aligning India's developmental goals in Viksit Bharat 2047 vision. Women agro-entrepreneurs create job opportunities in rural and semi-rural areas, boosting the growth of SMEs. They play an important role in enhancing food security and nutrition, helping build the SHGs network, and providing credit and financial inclusion. Encouraging women in the agricultural sector achieves economic autonomy for women and achieves balanced gender equality and sustainable development, contributing to the vision of the Viksit Bharat initiative.

This study explores how women agro-entrepreneurs play a key role in social and economic development, bridging the gap between rural-urban disparity and achieving balanced, sustainable growth, aligning with Viksit Bharat 2047.

This study adopts a case study approach, focusing on real-time cases of women agro-entrepreneurs who are pioneers in promoting sustainable agriculture, environmental protection, waste reduction, and women's empowerment. These objectives are closely aligned with India's Viksit Bharat 2047 vision. The study relies on secondary sources for data collection and analysis. This multi-source approach ensures a comprehensive perspective on the subject matter, enhancing the accuracy and reliability of the analysis.

RESEARCH OBJECTIVES

The research paper aims to study the crucial contribution of women agro-entrepreneurs to the economic growth of rural areas, concentrating on their role as drivers of progress and sustainability. It aims to identify and examine real-time case studies to explore the success stories of women agro-entrepreneurs, highlighting the strategies that led to their successes. Furthermore, the study investigates the key challenges faced by women in establishing and scaling their agro-businesses, providing insights into the barriers that hamper their growth.

A significant objective of the research is to evaluate the impact of women-led agro-entrepreneurship in achieving the ambitious Viksit Bharat 2047 vision, focusing on their potential as catalysts for national development. The study also examines the influence of value-added activities, Agri-tech innovations, and Agri-tourism on enhancing women's economic participation. Additionally, it evaluates the effectiveness of government policies, financial schemes, and institutional support in promoting women's agro-entrepreneurship.

The research further explores the adoption of sustainable practices by women agro-entrepreneurs, highlighting their contribution to environmental conservation. Based on these findings, the paper aims to recommend strategies to strengthen women's participation in agro-entrepreneurship, ultimately improving rural economic growth and promoting inclusive development.

REVIEW OF LITERATURE

Krishna Raj, Maithreyi, and Aruna Kanchi (2011). *Women Farmers in the* book explores the growing involvement of women in India's agricultural and allied sectors. The book stresses the challenges faced by female farmers and highlights their significant contributions to the agricultural landscape. The book highlights the role of women in crop cultivation, livestock management, and aquaculture. It focuses on the challenges faced by women Agro-

entrepreneurs. Authors also stress the need to empower women through education, technology, and skills development so as to enhance their productivity. **Kaur's *Women and Entrepreneurship in India: Governance, Sustainability, and Policy* (2021)** inspect the growing landscape of women entrepreneurs within India, highlighting governance, sustainability, and policy frameworks. The book focuses on the socio-economic challenges' women face, such as limited access to resources, gender disparities, and cultural constraints, which obstruct their entrepreneurial growth. It discovers the role of government initiatives, financial schemes, and institutional support in empowering women entrepreneurs, while disapprovingly analyzing gaps in policy implementation. The book also underlines sustainability and innovation as key drivers of women-led enterprises, offering insights into how women entrepreneurs contribute to India's economic and sustainable development goals. ***Women Entrepreneurship in the Indian Middle Class* by Jeemol Unni, Vanita Yadav, Swati Naik, and Dipa Dutta (2021)** provides an in-depth exploration of the entrepreneurial drives of women in India's increasing middle class, investigating the socio-economic and cultural factors that shape women's entrepreneurial ambitions and undertakings. It examines the barriers they face, such as balancing work and family, access to finance, and societal expectations, while also highlighting their resilience and innovative approaches. The authors analyse the role of education, technology, and government initiatives in fostering entrepreneurship, offering a nuanced perspective on how middle-class women are driving economic and social transformation. With real-life case studies and empirical data, the book serves as a valuable resource for understanding the connection between gender, class, and entrepreneurship in India. The book ***Entrepreneurship and Rural Women in India* by Jitendra Ahirrao** explores the connection between entrepreneurship and women's empowerment in rural India. The book provides a detailed analysis of the challenges, opportunities, and transformative potential of rural women's entrepreneurship. It highlights socio-economic factors, policy interventions, and case studies to underline its central theme. This work is particularly pertinent for understanding women's entrepreneurship in rural contexts, making it a valuable addition to the literature on rural development and gender empowerment. The book addresses topics such as Socio-economic Empowerment of Women, Challenges Faced by Rural Women Entrepreneurs, the Role of Self-Help Groups (SHGs), and the Impact of Government Policies.

RESEARCH GAP

The current literature on women in agriculture and entrepreneurship in India lacks alignment with the Viksit Bharat 2047 vision, emphasizing sustainability, inclusivity, and economic

resilience. Key gaps include limited focus on emerging technologies, partial analysis of policy implementation, and insufficient examination of regional diversity, sustainability, and socio-cultural transformation. Future research should link women's entrepreneurial contributions to India's long-term goals, integrate innovative technologies and climate-smart practices, address policy gaps, and highlight regional and sectoral diversity. This paper aims to understand the efforts of women agro-entrepreneurs as transformative leaders, driving sustainable development and socio-cultural change affiliated with India's progressive vision for 2047.

RESEARCH METHODOLOGY

The case method is especially useful for the examination of the topic, *The Role of Women Agro-Entrepreneurs in Achieving the Viksit Bharat 2047 Vision: The Analysis of Some Successful Cases from India*, as it offers enough ground for analysing case studies. This method seeks to understand the specific hurdles that women agro-entrepreneurs face and their 'stories' and 'heroes' in relation to the struggle towards Viksit Bharat vision 2047. The reason for adopting this strategy is based on the following important factors:

Understanding Contextual Challenges: Through the Case Study, the researcher is able to comprehend certain socio-economic, geographical, cultural, and even environmental barriers that women agro-entrepreneurs overcome, as well as their various regional and sectoral contexts of operation.

Detailed Examination of the Practices by Entrepreneurs: The case study method explains how women agro-entrepreneurs and leaders exercise their creativity, throughout women and resource management, which in turn leads to the realization of sustainable solutions to be practiced in the business. **Assessment of the achievements of women agro-entrepreneurs over Community Development and National Development:** This method measures not only the individual success of women agro-entrepreneurs but also their significance in terms of the development of the society and the nation at a more general level. **Assessment of Policies and Programmes –** Case studies are a means of evaluation of policies and programmes.

Ragi Cookie Project (Jawhar, Maharashtra) The Ragi Cookie Project highlights the convergence of health, sustainability, and rural empowerment. By creating millet-based snacks, the project addresses malnutrition and promotes millets, a climate-resilient crop. Its quick profitability and training programs for rural women underscore its economic and social impact. Yet, the venture's dependency on NGO support and limited market reach poses hurdles to sustainable growth.

Sobita Tamuli, a woman agro-entrepreneur from Assam, explores the initiative of producing organic manure, demonstrates the potential of grassroots innovation in empowering women while promoting sustainability. By utilizing local resources like banana plants and cow dung, she has created a successful model for organic farming. Her efforts address environmental concerns and support the local farming community, setting an example for eco-conscious agro-entrepreneurship. However, scalability and broader market integration remain key challenges.

Prema Gopalan's SSP focuses on multi-sectoral empowerment, especially in disaster-affected regions, fostering leadership among women in agriculture, healthcare, and energy. The initiative is a model of resilience, aligning with sustainability and inclusivity goals. By leveraging partnerships and community leadership, SSP showcases scalability and long-term impact. Challenges include reliance on external funding and overcoming cultural resistance in traditional communities.

CASE DISCUSSION

Sobita Tamuli's initiative has successfully created a business producing organic manure using locally available resources such as banana plants, leaves, and cow dung. Her initiative has not only improved her income but also contributed to the promotion of organic farming among local farmers. Prema Gopalan established Swayam Shikshan Prayog (SSP) to empower women entrepreneurs, particularly in disaster-affected areas such as Latur, Maharashtra, post the 1993 earthquake. SSP's work spans sectors like agriculture, healthcare, and energy, promoting leadership among women to drive social and economic development in their communities. The Ragi Cookie Project in Jawhar, Maharashtra, is a women-led initiative supported by an NGO to develop millet-based snacks, especially Ragi cookies. Leveraging food technology knowledge, the venture started with minimal resources and grew into a profitable enterprise. The project expanded to train other women, fostering rural employment, enhancing community livelihoods, and promoting the consumption of healthy millet-based foods.

Comparative Insights and SWOT Analysis

All three case studies emphasize women's empowerment, sustainability, and grassroots development. They highlight the role of innovative practices and community-driven approaches in achieving both local and national goals. While each initiative has unique challenges, their collective contribution demonstrates the potential of women agro-

entrepreneurs in driving social and economic transformation.

Table 1: Comparative SWOT analysis of cases

Aspect	Sobita Tamuli (Assam)	Prema Gopalan (SSP, Maharashtra)	Ragi Cookie Project (Jawhar, Maharashtra)
0 Strengths	Innovative organic manure product. Utilizes local resources. High demand among farmers. Promotes environmental benefits. Role model for women empowerment.	Multi-sectoral empowerment model. Focus on disaster resilience. Promotes community leadership. Scalable and replicable model. Recognized partnerships and credibility.	Health-focused millet snacks. Rural women training. Quick profitability. NGO support. Promotes millet-based sustainability.
1 Weaknesses	Limited scale of operations. Local market reach. Dependency on raw materials. Skills and capacity gaps.	Dependence on external funding. Cultural resistance. Resource-intensive model. Limited private sector engagement.	Dependency on NGO support. Limited market reach. Small-scale production. Lack of robust branding and marketing strategies.
2 Opportunities	Organic farming trends. Government support. Partnerships with NGOs. Expansion to other organic products. Digital marketing.	Expand to new regions. Use of digital platforms. Alignment with national goals. Collaborations with corporates. SDG alignment enhances relevance.	Growing health-conscious market. Government support for millets. Product diversification. E-commerce potential. Institutional collaborations.
3 Threats	Competition from larger firms. Market volatility. Climate risks. Regulatory changes.	Uncertain funding. Disaster vulnerability. Policy and regulatory challenges. Resistance to change in conservative areas.	Competition from other brands. Supply chain challenges. Limited millet acceptance. Economic instability affecting raw material costs and demand.

CONCLUSION

This study underscores the transformative potential of women agro-entrepreneurs in achieving the vision of **Viksit Bharat 2047**, emphasising inclusivity, sustainability, and economic resilience. The case studies of Sobita Tamuli, Prema Gopalan, and the Ragi Cookie Project demonstrate how grassroots innovation, resource optimization, and community leadership can empower women to become drivers of change in agriculture and entrepreneurship. While challenges like scalability, market integration, and policy alignment persist, these initiatives provide valuable insights into leveraging women's entrepreneurial capabilities for national development. By addressing gaps in technology adoption, policy frameworks, and socio-cultural transformations, women agro-entrepreneurs can be positioned as key stakeholders in building a progressive and inclusive India by 2047.

REFERENCES

1. Government of India. (2023). Viksit Bharat 2047 Vision Document. New Delhi: Government of India Publications.
2. Kaur, R. (2021). Women and Entrepreneurship in India: Governance, Sustainability, and Policy. New Delhi: Springer.
3. Press Information Bureau. (2023). Economic Survey 2023 Highlights. Government of India.

4. Unni, J., Yadav, V., Naik, S., & Dutta, D. (2021). Women Entrepreneurship in the Indian Middle Class. New Delhi: Routledge.
5. Ahirrao, J. (2020). Entrepreneurship and Rural Women in India. Hyderabad: ICFAI Press.
6. Krishna Raj, Maithreyi, and Aruna Kanchi (1 January 2011). Women *Farmers in India*. 3rd ed., National Book Trust, Publisher : NBT; 3rd edition , ISBN-13 : 978-8123753195

SFCC Dnyanakosh



Thane off Eastern Express Highway, Dnyanasadhana Marg,
Thane - 400604 Maharashtra, India