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GIS study of rejuvenated textile industries in Coimbatore, Tamil Nadu, India.

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Abstract
Background: The textile industry in Coimbatore, commonly known as the "Manchester of South India," came into existence around the early 1900s. The textile sector flourished here due to the abundance of cotton, proximity to the Western Ghats for hydroelectricity, and the availability of trained workers. The establishment of numerous spinning, weaving, and garmenting units enabled the city to become an important center for this trade. The city currently is an important cog in the moving wheel of India's textile industry with great regard for quality and innovation for both domestic and foreign industries.
Aim: The research is to develop GIS mapping of rejuvenated textile industry in Coimbatore.
Objectives: For the identification of the growth of the textile industry in Tamil Nadu and Coimbatore, for analysis of rejuvenation of the textile industry from Coimbatore, Tamil Nadu, in the chosen organization and firms, to visualize GIS patterns of the finest textile industries in Coimbatore.
Research question: RQ 1) Why Coimbatore growth in textile industry is being mapped as Tier-2 city in India? RQ 2) What are textile industries in India and how it was developed?
Methodology: Literature reviews – with 10 papers reviews on the GDP, Tourism and industries in Tamil Nadu. Additionally considering my topic in textile industry for which 5 paper were reviewed.
Methods and results: With the help of ArcGIS Pro, I identified Tamil Nadu shape files and attribute tables from the census data 2011. With the help of symbiology to create different patterns of textile industries and redeveloped textile mill like Lakshmi mills, Coimbatore.
Conclusion: Identifying, analyzing and visualization of textile industries in Coimbatore region has helped to create GIS patterns, Explaining the growth and current affairs in the textile industry.
The textile sector in Coimbatore exhibits a significant degree of spatial con-centration, which is accompanied by notable challenges related to infrastructure and environmental sustainability, as evidenced by Geographic Information System (GIS) mapping analyses.
Limitations: This study focuses on demographic and economic spatial data due to limitations in data availability and time constraints. Future research on Mumbai could expand to include sustainable indicators such as environmental factors, technological advancements, and governance practices.

Keywords: Coimbatore, GDP (GIS (Geographic Information System) mapping, Environmental impact, spatial analysis, Textile industry.

BACKGROUND

Coimbatore prospered in the textile industry because of its favorable climate and abundant cotton cultivation, which created a solid foundation for textile manufacturing. Its standing was further improved by the construction of spinning mills during British colonial control, which turned the city into a hub for the production of textiles and the processing of cotton, earning it the moniker "Manchester of South India."

Historical factors

a) British Colonial influence Coimbatore has become well-known for its cotton and colored textiles, turning the textile industry into a major business. The city's weavers are appreciated for their extraordinary weaving and dying abilities, which have helped the area's textile manufacturing and equipment grow. An important turning point in the timeline of the sales was the construction of cotton pressing and cleaning facilities in the late 1800s.
b) During the British colonial era, Coimbatore's textile sector expanded significantly, with spinning mills gaining special traction. The textile industry's basis was solidified by the 1930s, which paved the way for Coimbatore to emerge as a major force in the world market.

Modernization of textile industry in Coimbatore

a) Modern mechanical production has replaced traditional handloom methods in Coimbatore's textile industry.

b) With spinning mills, weaving businesses, dyeing facilities, and clothing makers, the city has a diverse textile environment.
c) The textile sector in Coimbatore relies heavily on innovation and sustainability initiatives.
d) The prosperity of regional businesses in the global marketplace has been supported by a trained labor force and advantageous government regulations.
e) The textile ecology in the belt keeps evolving in accordance to worldwide trends.

AIM

The study aims to develop GIS mapping for Coimbatore's textile industry and its rejuvenation of textile hubs. GIS mapping can show spatial data. Spatial data includes factory locations, supply chains, and environmental impact areas. This mapping will help visualize and analyze industry activities. Analyzing helps to improve decision-making and resource allocation. For example, GIS can also map spinning mills and garment factories. This detailed view aids in spotting inefficiencies. It also helps in planning sustainable growth within the textile sector.

OBJECTIVES

Objective 1 - *To identify the textile industry growth in Tamil Nadu and Coimbatore*

GIS mapping can identify textile industry growth in Tamil Nadu and Coimbatore. These maps utilize data visualization to provide key insights.

Objective 2 - *To analyze the rejuvenation of textile industry from Coimbatore, Tamil Nadu in the selected organization and companies*

The objective is to conduct a comprehensive examination of the rejuvenated textile sector in Coimbatore, focusing specifically on the chosen organization and its associated companies. This analysis will study the various aspects of the industry, including the revitalization process. This will help in analyzing the refurbishment of some famous textile hubs in Coimbatore.

Objective 3 - *To visualize GIS patterns of the best textile industries in Coimbatore*

1. The goal is to produce a graphic depiction of geographic information system (GIS) patterns that showcase Coimbatore's most notable textile companies. The vital thing to provide a thorough grasp of these businesses' geographic relevance and economic effect, it is necessary to analyze spatial data in order to identify and depict the concentration and distribution of these industries within the region.

2. The goal is to map out the Coimbatore textile industry using GIS technology, highlighting the locations and operating sizes of the top textile producers. In addition to helping stakeholders evaluate the dynamics of the business, this visualization will offer insights into regional development trends, resource allocation, and possible investment opportunities in the textile sector.

LITERATURE ANALYSIS

#	1	2	3	4	5
Title of the paper	A quantitative analysis of social and economic development among Indian states by S.N. Nandy HARSAC, CCS Haryana Agricultural University Campus, Hisar-125004, India	DRIVING ECONOMIC GROWTH: THE VITAL ROLE OF SMALL-SCALE INDUSTRIES IN TAMIL NADU AMIDST GLOBAL CRISIS by Yoganandham Govindharaj THIRUVALLUVAR UNIVERSITY (A STATE UNIVERSITY), TAMIL NADU · DEPARTMENT OF ECONOMICS	A STUDY ON WOMEN ENTREPRENEUR'S AWARENESS ABOUT GOVERNMENT SCHEMES-SPECIAL REFERENCE TO CHENNAI DISTRICT, TAMIL NADU by G. Lakshmi Priya1 , Dr. S. Smilee Bose2	EXPLORING THE DYNAMICS OF HUMAN DEVELOPMENT IN TAMIL NADU By Ajad Singh Moti Lal Nehru College-University of Delhi Doctor of Philosophy	Utilizing Aerial Photography to Trace the Development of Urbanization in the Chennai District By K. Hemalatha , R. Kamali , R. Pushpalatha , M. Saranya , P. Vijayalakshmi
Journal Name and Publisher	International Research Journal of Social Sciences: www.isca.in.	Research gate	IAEME Publication	Research gate	International Research Journal on Advanced Engineering Hub
Month and Year of Publication	April (2021)	May (2024)	Sep-21	Decemeber (2022)	Apr-24
Objectives of the Study / Research	This paper examines economic growth in India's states, analyzing disparities, and assessing socio-economic indicators to determine if economic growth contributes equitably to social progress.	The study aims to examine the relationship between economic growth, social progress, and disparities in Indian states, providing policymakers with insights into potential intervention areas.	The study aims to evaluate the awareness and participation of women entrepreneurs in Chennai regarding government schemes for entrepreneurship, identify factors influencing their participation, and analyze the impact of training programs.	The objectives of the study are to estimate the standard of living by HDI of Tamil Nadu and to analyze the trends of changing HDI in Tamil Nadu since 1991.	The objective of the study is to examine the problem of urban sprawl in the United States, which is caused by swift population increase, and the negative consequences it has on forests, agricultural areas, and ecosystem services.
Methodology adopted in the Study / Research	The study examines the link between economic growth and social progress in Indian states, emphasizing the need for inclusive growth and good governance for equitable development.	The study utilized secondary data from reliable sources like Census of India, NSSO, and Planning Commission, analyzed economic and social indicators using statistical measures, and presented findings through relative comparisons and spatial mapping.	A survey of 200 Chennai women entrepreneurs was conducted using primary and secondary data, and statistical tools like ANOVA, Chi-square tests, and t-tests were used for analysis.	The study uses secondary data from Tamil Nadu, including life expectancy at birth, employment and unemployment surveys, and various economic and statistical sources, to calculate the HDI of the state. The HDI is calculated using three component indices: Education Index, Income Index, and Health Index.	The study utilizes SAR data to quickly locate urban areas, compares and evaluates Wishart and SVM supervised classification techniques, and uses remote sensing and GIS applications to analyze built-up area growth and environmental impact.
Results of the Study / Research	The study reveals that Indian states with larger economies tend to achieve higher social progress, while lower-income states like Kerala also perform well. Notable progress is seen in Tamil Nadu, Himachal Pradesh, Uttarakhand, Punjab, and Sikkim.	Higher economic growth states generally show better social progress, with Kerala being exception. Significant intra- and inter-state disparities impact development, with social infrastructure and governance quality being key drivers.	The study found that most women entrepreneurs are only moderately aware of government schemes, except for the Stree Shakthi Package, and social media is the primary source of awareness.	The results showed that Tamil Nadu has made significant progress in improving education, income, and health outcomes for its citizens over time. The HDI of Tamil Nadu increased from 0.457 in 1993-94 to 0.692 in 2017-18.	The results indicate that SVM performed better in categorizing urban and non-urban areas than the Wishart algorithm.
Limitations of the Study / Research	The study faces limitations due to the absence of time-series data, potential inaccuracies in comparing states, and the use of secondary data, emphasizing the need for further research.	The study's limitations include reliance on secondary data, inadequacy of time-series data, and potential bias in conclusions due to comparison across diverse states regardless of size and population.	The study's limitations include its focus on a single district, potential biases in self-reported data, and limited evaluation of long-term impacts of awareness and training programs on business success.	The paper uses secondary data on Tamil Nadu, but acknowledges limitations in representing inter-state differences in rupee purchasing power and lacks data to confirm or deny these differences. It relies on self-estimation from NSSO and data from the 21-24 age group.	The study highlights the limitations of urban development in the Chennai district, including the lack of green spaces, bodies of water, and open spaces.
Gaps Identified in the Study / Research	The study underscores the need for long-term data analysis to understand the link between economic growth and social progress in India, emphasizing the significance of equitable resource distribution and good governance for socio-economic development.	The paper highlights research gaps such as insufficient longitudinal analysis, limited regional variability focus, lack of micro-level insights, cross-parameter analysis, lack of robust time-series analysis, overlooking district trends, and insufficient integration of economic measures with qualitative social metrics.	The study reveals low awareness among women entrepreneurs about government schemes, highlighting the need for targeted outreach and education. It lacks a comparative analysis of effectiveness and accessibility across different regions or industries, focusing mainly on Chennai district.	The study included the years 1993-94, 1999-2000, 2004-05, 2011-12, and 2017-18.	The study suggests that future Chennai urban development should follow government plans to mitigate urban sprawl's negative impacts. Future studies could focus on developing strategies to mitigate the environmental impact of urbanization.
Remarks	The article highlights India's economic-social linkage issues, highlighting regional disparities in economic and social development. It suggests effective governance and investment in social infrastructure are crucial for balancing economic growth with social development.	The text highlights the significance of small-scale industries (SSIs) in Tamil Nadu for economic growth, addressing challenges like limited finance, regulatory issues, infrastructure problems, and competition. It advocates for government interventions, skill development, infrastructure enhancements, and collaboration with academia and industry.	Start-Up India training programs enhance women entrepreneurs' skills and innovative business solutions, but inadequate infrastructure hinders growth. Social media helps disseminate entrepreneurial schemes, and women entrepreneurs prioritize employment creation, highlighting their role in social and economic development.	The study concludes that Tamil Nadu has made significant progress in increasing the well-being of its citizens, but there is still room for improvement. The state can continue to invest in initiatives such as expanding access to education, promoting economic growth, improving healthcare, reducing income inequality, and promoting sustainable development to further increase its HDI.	The study concludes that urban planning authorities can lessen the social-ecological impacts of urban sprawl and maintain ecosystem services by using the useful insights and metrics provided by this study.

Table 1 Literature analysis part one

#	6	7	8	9	10
Title of the paper	GIS based urban social vulnerability assessment for liquefaction susceptible areas: a case study for greater Chennai, India by Saravana Ganesh Manoharan; Ganapathy Pattukandan Ganapathy	Urban growth analysis of Tamil Nadu state, India using VIIRS DNB night data during 2012 and 2016 By Rama Subramoniam Sudalayandi; E. V. R. Srinivasan; Ganesha Raj Kasaragod	Industrial Clusters in India: Evidence from Automobile Clusters in Chennai and the National Capital Region Aya OKADA* and N.S. SIDDHARTHAN ** April 2007	A study of tourist inflow in Tamilnadu 2001-2012 – A GIS based study by Mahamad S.; Latha G.; Manikandan N., and others	Technical Efficiency of Automotive Industry Cluster in Chennai by E. Bhaskaran
Journal Name and Publisher	Springer open	Science direct		INTERNATIONAL JOURNAL OF GEOMATICS AND	Springer open
Month and Year of Publication	Jan-23	Jul-05	Apr-07	2014	2012
Objectives of the Study / Research	The aim of the study is to prepare a vulnerability assessment of Greater Chennai due to soil liquefaction based on geological and geomorphological settings along with thematic integration of socio-economic parameters.	The objective of the study is to analyze urban growth trends in Tamil Nadu using nighttime satellite data and provide insights for policymakers to allocate resources and plan for development.	The objectives of the study are to analyze the patterns of agglomeration of modern manufacturing sectors in India, examine the factors that led to different patterns of cluster development in two leading auto clusters in India, and investigate whether firms in clusters perform better than those that are excluded.	The objectives of the study are to analyze the foreign and domestic tourist arrivals in Tamil Nadu and to find the growth rate of Tamil Nadu tourism from 2001 to 2012.	The objectives of the study are to: (i) study the correlation analysis of automotive components industry cluster in Chennai before and after the CDA, (ii) study the regression analysis of automotive components industry cluster in Chennai before and after the CDA, and (iii) study the technical efficiency of automotive components industry/cluster in Chennai before and after the CDA.
Methodology adopted in the Study / Research	The study utilized GIS technology to integrate geological and geomorphological parameters with socioeconomic factors, focusing on liquefaction susceptibility and exposure map, incorporating population density and housing conditions.	The study utilized VIIRS DNB night data from 2012 to 2016, classified into five categories based on illumination level, and analyzed using image processing techniques and GIS.	The study utilizes quantitative and qualitative methods to analyze spatial distribution patterns in modern manufacturing industries and differential behavior between clustered and non-cluster auto component firms.	The study uses secondary data collected from the tourism department in Tamil Nadu and other government-published data. The data are analyzed using simple statistical and cartographic methods, including bar charts to show tourist visits.	The study utilizes correlation, regression, and data envelopment analysis to analyze data from 21 auto component manufacturers, focusing on technical efficiency of ACIs before and after CDA.
Results of the Study / Research	The study created a liquefaction susceptibility and social exposure map, revealing that 53% of Greater Chennai's households and population are highly exposed to soil liquefaction hazards, based on a vulnerability assessment map derived from these maps.	The study reveals that the western corridor of Tamil Nadu experiences more urban growth than other areas, with districts categorized into more, medium, and less developed. The built-up category increased from 2012 to 2016, with areas with high light intensity values classified as city areas and low light intensity values as forest and vegetative areas.	The study reveals that Indian industrial clusters, primarily concentrated in NCR, Mumbai-Pune, and Chennai-Bangalore, perform better than non-clustered firms, with auto component firms positively impacted.	The study reveals a significant increase in tourist arrivals in Tamil Nadu from 2001 to 2012, with a growth rate of 34.1% in 2012. The top three districts for domestic tourist arrivals are Chennai, Dindigul, and Madurai, while the top three districts for foreign tourist arrivals are Chennai, Kanchipuram, and Nilgiri.	The study demonstrates a significant improvement in the correlation coefficient and technical efficiency of ACIs following the implementation of CDA, using input and output data.
Limitations of the Study / Research	The study provides a tool for identifying areas needing immediate attention and detailed investigations, but does not consider factors affecting liquefaction, and is limited to first-level research.	The study is limited to Tamil Nadu State, India, and the results may not be generalizable to other regions or countries.	The study does not discuss the limitations of the research.	The study is limited by the availability of secondary data and the dearth of data, which restricted the scope of the analysis.	The study does not mention any limitations. No limitations of the study are explicitly mentioned in the text.
Gaps Identified in the Study / Research	The study suggests that further detailed investigations are needed to validate the results and to develop more accurate vulnerability assessments. Future studies can refine the hazard maps by considering additional factors and conducting site-specific studies.	The study utilizes VIIRS DNB night data to analyze urban growth in Tamil Nadu, India, from 2012-2016, enhancing remote sensing data monitoring and planning in developing countries.	The study explores the spatial dimension of industrial development in developing countries, particularly India, highlighting the need for systematic research on cluster formation and variations.	The study's findings can be used to inform policy decisions and marketing strategies to promote tourism in Tamil Nadu, including the development of infrastructure and the promotion of sustainable tourism practices.	The research gap was the need for a study on the technical efficiency of the Chennai Auto Cluster before (2001–2004) and after (2005–2007) the cluster development approach (CDA).
Remarks	The study highlights the vulnerability assessment map's importance in disaster management, particularly in Greater Chennai, where soil liquefaction hazards are prevalent due to high population and building density.	The study provides valuable information for policymakers and planners to help develop industrial estates, improve transportation facilities, and plan new industrial developments. The study concludes that the findings can be used by policymakers to allocate resources and plan for development in a scientific manner, which can help in uniform growth of all districts in the state.	The study reveals that Indian industrial clusters, primarily concentrated in NCR, Mumbai-Pune, and Chennai-Bangalore, significantly influence firm performance across different manufacturing sectors. Clusters have higher productivity per rupee spent on labor and lower export intensity, emphasizing the importance of state government intervention in industrial estates and infrastructure development.	The study concludes that Tamil Nadu has immense potential for the development of different kinds of tourism, with a well-developed infrastructure, including accommodation and transportation facilities. The state's tourism industry has shown significant growth, with a growth rate of 16% in 2012.	The study reveals that the implementation of the Cluster Development Approach (CDA) has significantly improved the technical efficiency of the Chennai auto cluster and Chennai auto components industries, enabling them to become more efficient and competitive in the global market, thanks to the existing policies of the Government of India and Tamil Nadu.

Table 2 Literature analysis part two

#	11	12	13	14	15
Title of the paper	A Study on Growth and Financial Performance of Selected Textile Companies in Coimbatore District by P. Chellasamy; N. Sumathi	FINANCIAL PERFORMANCE OF TEXTILE INDUSTRY: A STUDY ON LISTED COMPANIES OF TAMIL NADU by Marimuthu, K.N University of Hyderabad, Hyderabad, India	Ethics and Social Responsibility in Indian Textile Industry (A Study on Textile Industries of Coimbatore and Tirupur, Tamil Nadu) Pulidindi Venugopal* [Ph.D.], B. Giasuddin and J. Sivaji.	A Study On Quality Of Work Life In Textile Sector In And Around Coimbatore District Dr. A. Valarmathi, Director, Vivekananda Institute of Management Studies, Coimbatore Dr. Hema Bhalakarishnan, Associate Professor, Vivekananda Institute of Management Studies, Coimbatore	TRENDS AND FACTORS AFFECTING THE PROFITABILITY OF SELECTED PUBLIC LIMITED TEXTILE MILLS – A STUDY IN COIMBATORE DISTRICT by Dr.S.Chandra Bose Associate Professor, Sri Kaliswari Institute of Management and Technology, Sivakasi
Journal Name and Publisher	Journal of global economics	IJRMEC	ISSN (Online)	Journal of Business Management & Social Sciences Research (JBM&SSR)	Review of literature of Shine and soeman
Month and Year of Publication	2019	Nov-22	Mar-15	February 2013	Apr-15
Objectives of the Study / Research	The objectives of the study are to analyze the financial performance and growth trend of selected textile companies in Coimbatore district and to identify their strengths and weaknesses.	The objective of the study is to analyze the performance of the textile industry in the selected companies from Tamil Nadu, focusing on working capital and financial performance.	The study aims to explore ethics and social responsibility in Indian textile industries, analyze policies, identify good practices and bottlenecks, and provide suggestions for improved implementation of ethics and CSR.	The objectives of the study are to find out the overall job-related satisfaction of employees in various aspects of quality of work life, to determine the extent of influencing quality of work life factors, and to identify the opinion on training with respect to gender and designation.	The objectives of the study are to examine the trends in profitability and solvency position of selected public limited textile mills, measure the relationship between net sales and net profit, and analyze the factors affecting profitability.
Methodology adopted in the Study / Research	The study utilizes secondary data from corporate databases and statistical techniques to predict future trends in the textile industry using least squares method for financial ratios.	The study employs financial and statistical tools like ANOVA and descriptive statistics to analyze data from CMIE and annual reports, evaluating company financial performance using profitability, efficiency, and liquidity ratios.	The study utilized primary and secondary data from various sources, including books, journals, and internet, and a questionnaire administered to 500 respondents from the textile industry in Tirupur, India.	The study uses a descriptive research design, with data collected through questionnaires and in-depth interviews with employees and employers. The statistical tools used for analysis include descriptive analysis, one-way ANOVA, two-way ANOVA, and Pearson's correlation.	The study utilizes secondary data from various sources, including textile mills' profit and loss accounts, balance sheets, and annual reports, to analyze the relationship between net sales and profitability.
Results of the Study / Research	The study analyzes financial ratios, including liquidity, profitability, and asset management, and predicts that Super Sales Spinning Mills Limited will have the highest net sales in 2010 compared to Super Sales India Limited, Prime Textile Limited, and working capital, with the trend movement indicating a higher level of financial performance.	The study reveals significant differences in current, quick, interest coverage, debtors, and creditors ratios among selected textile companies, with KPRML showing the highest profitability ratios, including profit after tax, net of price earnings, and return on total assets and equity.	The study reveals that textile industries in Tirupur are causing severe harm to the environment and to all living creatures, despite the existence of laws and regulations. The study found that the textile industry in Tirupur prioritizes profits over environmental and social issues, neglecting issues such as water pollution, child labor, and worker welfare.	The results of the study show that employees are not satisfied with their salary and compensation, and that there is a significant difference in the mean opinion on job security and authority to do work among different designations. Additionally, the study finds a positive correlation between fair compensation and career opportunities.	The study reveals a significant correlation between net sales and net profit, with factors like operating profit ratio, liquidity ratio, solvency ratio, stock turnover ratio, fixed asset management, and working capital management influencing textile mill profitability. All eight public limited textile mills in Coimbatore district show a positive relationship, while six out of eight companies have no significant relationship with profitability and influencing factors.
Limitations of the Study / Research	The study examines 11 textile companies in Coimbatore district, using secondary data, which may not accurately reflect their financial performance. It is limited to 8 companies and may not be representative of the entire Indian textile industry.	The study is limited to five textile companies listed on the CMIE with high net worth in 2011, and the results may not be generalizable to other companies in the industry. The study does not mention any limitations.	The study is limited to the textile industry in Tirupur, Coimbatore District, Tamil Nadu, India, and may not be generalizable to other industries or regions.	The study does not mention any limitations.	The study is limited to eight public limited textile mills in Coimbatore district, and the results may not be generalizable to other textile mills.
Gaps Identified in the Study / Research	The provided text focuses on the financial performance and growth trends of selected textile companies in Coimbatore, India, between 1995-96 and 2005-06. It doesn't explicitly state a research gap in the 100-word limit, but implicitly, a gap is suggested by its limitations: the study uses a convenient sample of only 8 companies and relies on secondary data, which may limit the generalizability of its findings.	The study examines the financial performance of five Tamil Nadu textile companies from 2001-2011, focusing on working capital and profitability. It uses data from CMIE Prowess, annual reports, and publications. The research builds on previous studies on the Indian textile industry, specifically focusing on Tamil Nadu companies and their financial ratios over an extended period.	The study explores ethical and social responsibility practices in the Coimbatore textile industry, highlighting a gap in prioritizing sales and exports over environmental and social concerns. It aims to examine the impact of these practices on society and the environment, offering suggestions for improvement.	The study explores the link between quality of work life (QWL) and job satisfaction, highlighting factors like fair compensation, healthy working conditions, and growth opportunities. It acknowledges the under-explored relationship between job satisfaction and stress, and the interplay between work, non-work aspects, individual characteristics, and economic/cultural climates.	The study examines profitability trends and influencing factors of eight public limited textile mills in Coimbatore, India, from 2003-04 to 2012-13. It uses secondary data to examine profitability, solvency, and the relationship between net sales and net profit. The research does not cover private textile companies or other industries, suggesting further expansion.
Remarks	The study reveals that the financial performance of textile companies in Coimbatore district varies, emphasizing the importance of understanding their strengths and weaknesses to enhance their competitiveness in the globalized textile economy. Gangotri textile limited's performance was satisfactory, while the remaining companies' performance was moderate.	The study reveals that the textile industry's financial performance in Tamil Nadu is influenced by factors like working capital management, profitability, and efficiency. It recommends companies enhance their management, reduce debt, and boost profitability. KPRML is the most efficient, suggesting investors invest in long-term profit margin.	The study concludes that textile industries in Tirupur are unethical and socially irresponsible, and that there is a need to implement ethics and CSR in a better way to protect the environment and society. The study concludes that the textile industry in Tirupur needs to prioritize ethical and social responsibility, including environmental sustainability, worker welfare, and social welfare activities.	The study concludes that organizations should provide fair compensation, job security, and opportunities for career growth to improve the quality of work life of their employees. Additionally, the study suggests that organizations should provide a healthy work environment, participative management style, and recognition to motivate employees.	The study reveals that various textile mills have varying profitability and solvency positions, with factors like net sales, operating profit ratio, and working capital management affecting profitability. It also finds a significant positive relationship between net sales and net profit, while fixed assets management and short-term liquidity negatively impact profitability.

Table 3 Literature analysis part three

SNo	Title of the Paper	Coimbatore	Gross Domestic Product (GDP)	GIS MAPPING	Environmental impact	Spatial analysis	Textile industry
1	A quantitative analysis of social and economic development among Indian states		✓			✓	
2	DRIVING ECONOMIC GROWTH: THE VITAL ROLE OF SMALL-SCALE INDUSTRIES IN TAMIL NADU AMIDST GLOBAL CRISIS		✓		✓	✓	
3	A STUDY ON WOMEN ENTREPRENEUR'S AWARENESS ABOUT GOVERNMENT SCHEMES- SPECIAL REFERENCE TO CHENNAI DISTRICT, TAMIL NADU		✓				
4	EXPLORING THE DYNAMICS OF HUMAN DEVELOPMENT IN TAMIL NADU				✓		
5	Utilizing Aerial Photography to Trace the Development of Urbanization in the Chennai District		✓			✓	
6	GIS based urban social vulnerability assessment for liquefaction susceptible areas: a case study for greater Chennai, India			✓		✓	
7	Urban growth analysis of Tamil Nadu state, India using VIIRS DNB night data during 2012 and 2016			✓			
8	Industrial Clusters in India: Evidence from Automobile Clusters in Chennai and the National Capital Region		✓	✓		✓	
9	A study of tourist inflow in Tamilnadu 2001-2012 – A GIS based study		✓				
10	Technical Efficiency of Automotive Industry Cluster in Chennai		✓				
11	A Study on Growth and Financial Performance of Selected Textile Companies in Coimbatore District	✓	✓				✓
12	FINANCIAL PERFORMANCE OF TEXTILE INDUSTRY: A STUDY ON LISTED COMPANIES OF TAMIL NADU		✓				✓
13	Ethics and Social Responsibility in Indian Textile Industry (A Study on Textile Industries of Coimbatore and Tirupur, Tamil Nadu)	✓	✓		✓		✓
14	A Study On Quality Of Work Life In Textile Sector In And Around Coimbatore	✓	✓				✓
15	TRENDS AND FACTORS AFFECTING THE PROFITABILITY OF SELECTED PUBLIC LIMITED TEXTILE MILLS – A STUDY IN COIMBATORE DISTRICT	✓	✓				✓

Table 4 Taxonomy of literature analysis

RESEARCH QUESTIONS

Research Question 1) Why Coimbatore growth in textile industry is being mapped as Tier-2 city in India?

The main reason Coimbatore is a Tier 2 city is because of its substantial economic activity as a major hub for manufacturing, especially in the fields of engineering and textiles, as well as its expanding IT industry, highly skilled labor force, and well-developed infrastructure. It also maintains a lower cost of living than major Tier 1 cities, which attracts talent and businesses.

Research Question 2) What are textile industries in India and how it was developed?

India is one of the world's oldest textile industries, having a long history that dates back to the Indus Valley Civilization, when cotton was first spun and woven into cloth. During the pre-colonial era, India was known for its exquisite cotton, silk, and muslin fabrics, but the introduction of large-scale factory production during the British colonial era caused traditional hand-loom weaving to decline, which resulted in a shift towards modern textile mills after India gained independence, defining it one of the world's largest producers of cotton and textiles today.

CASE STUDY OF REJUVENATED TEXTILE INDUSTRY IN COIMBATORE, TAMIL NADU, INDIA

Lakshmi mills Coimbatore.

History

As the textile center of Tamil Nadu, Coimbatore is expressed to as the "Manchester City of South India" because to the variety of textile businesses that thrive there, which are supported by the state's expansive cotton fields. A textile company established by the late G. Kuppuswamy Naidu, a visionary pioneer, made its way into the yarn and fabric production division of textile mills in Tamil Nadu, known as "The Lakshmi Mills," more than a century ago, in 1910. In addition to helping the industry flourish, this famous mill was instrumental in writing the history that resulted in Coimbatore's renaming as Manchester City.

Downfall

A handful of the factory's divisions moved their activities to another location in 2008. Modern technology and instrument development caused a financial problem that ultimately resulted in Lakshmi Mills' major collapse in 2012. However, in 2013–14, output and sales increased as outcome of the industrial facilities' modernization effort. The proprietors of Lakshmi Mills renovated the mill between 2019 and 2020 with the goal of establishing an urban center while preserving the historic buildings' rustic character. This included the construction of temporary retail spaces, commercial plazas, and other amenities.

Figure 1 Lakshmi Mills Manufacturing unit_©www.lakshmimills.com

Figure 2 Interiors at Lakshmi Mills Manufacturing unit_©www.lakshmimills.com

Rejuvenation of Lakshmi mills into an urban hub

Evolution and Lakshmi Mills are closely related. To make her happy memories available to the public, Aishwarya Pathy, G. Kuppuswamy Naidu's great-granddaughter, revamped this mill as a commercial complex. The main aim, keeping adaptive reuse in mind, was to preserve and use the old buildings while laying emphasis on innovation and design equal to or better than current trends. All the buildings within the city center replicate the appearance of an old mill and the beautiful architecture that bore it.

a) *Revival & Reuse:* Lakshmi Mills, a heritage industrial complex, has been redeveloped as a contemporary urban hub, led by Aishwarya Pathy. The emphasis was on adaptive reuse, retaining the original mill's architecture and incorporating modern design.

b) *Commercial & Aesthetic Blend:* The makeover involved creating store spaces for brands such as Westside, Croma, and Zudio, all of which were designed with industrial architectural features such as exposed brick and large windows. Such a fusion of utility and aesthetics was a trendsetter.

Figure 3 Before and after comparison of Lakshmi mills rejuvena-tion_©https://www.studiolotus.in/projects/lakshmi-mills-redevelopment

c) *Community Focus:* Recognizing the shrinking of community spaces, Lakshmi Mills Urban Centre aims to create a hub for interaction through shop-ping, food courts, an amphitheater, pop-up streets, and public squares.

Figure 4 Before and after comparison of Lakshmi mills rejuvena-tion_©https://www.studiolotus.in/projects/lakshmi-mills-redevelopment

*Figure 5 Before and after comparison of Lakshmi mills rejuvenation_*

©https://www.studiolotus.in/projects/lakshmi-mills-redevelopment

d) *Thoughtful Design:* The design emphasizes accessibility and comfort, with carefully planned zones (Retail, Cultural, Commercial, etc.), preserved greenery, and pedestrian-friendly paths.

e) *Heritage & Modernity:* The interiors maintain the spirit of the old mill, combined with modern art deco and murals. Double-height spaces and abundant natural light contribute to an inviting atmosphere.

f) *Legacy & Inspiration:* The successful transformation serves as an example for future generations, demonstrating how to preserve and celebrate historical legacies while embracing contemporary design and social connection. It encourages young architects and designers to find creative solutions to simi-lar challenges.

Floor plans

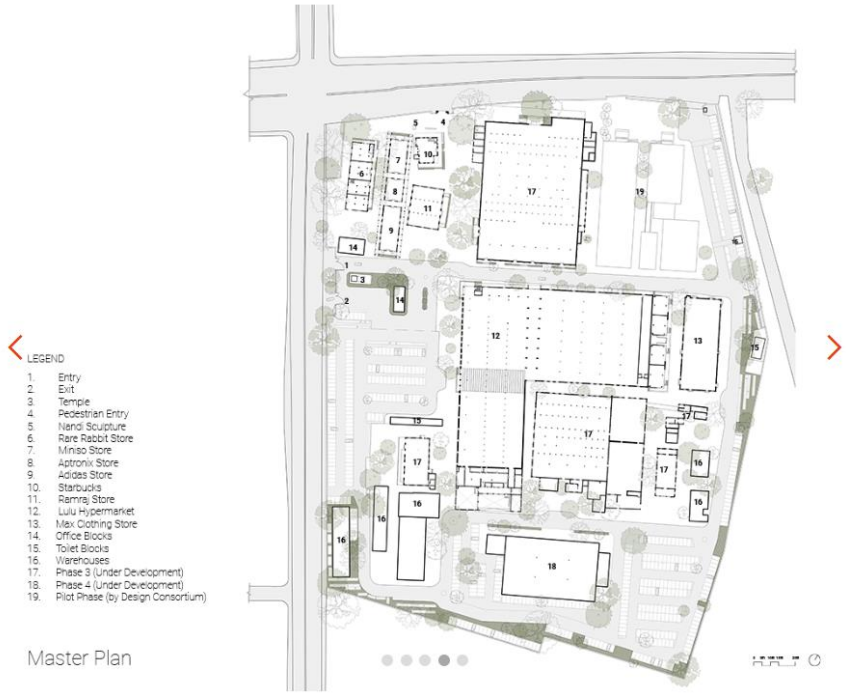

Figure 6 Master plan of Lakshmi mills redevelopment_©https://www.studiolotus.in/projects/lakshmi-mills-redevelopment

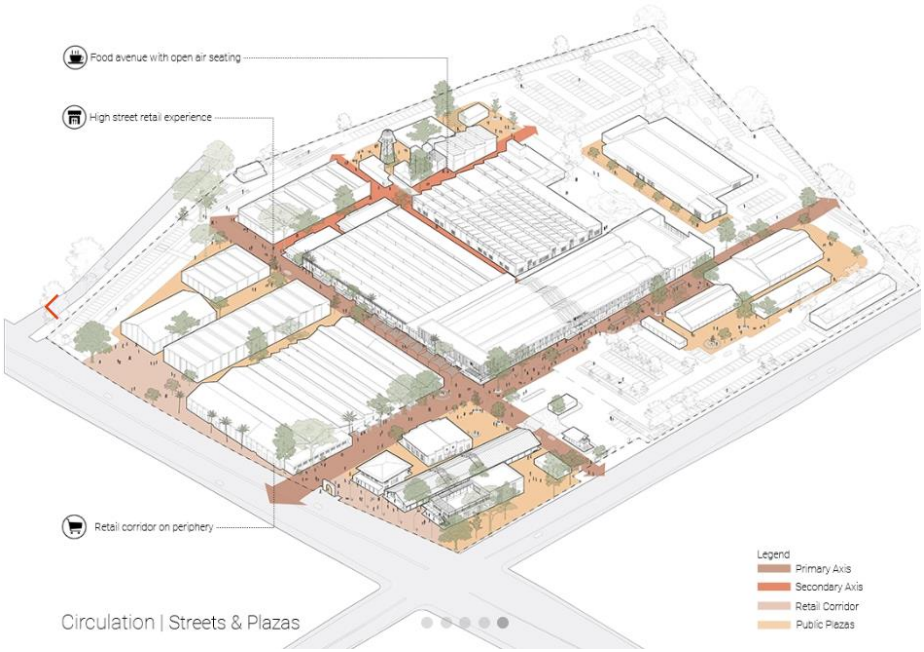

Figure 7 Circulation axonometric of Lakshmi mills redevelop-ment_©https://www.studiolotus.in/projects/lakshmi-mills-redevelopment

Figure 8 Aerial view of Lakshmi mills rejuvena-tion_©https://www.studiolotus.in/projects/lakshmi-mills-redevelopment

Figure 9 Aerial view sketch of Lakshmi Mills, Coimbatore_©https://issuu.com/deepalikhunteta

METHODS AND RESULTS: ANALYZING DATA USING ARCGIS PRO

Methodology

1. *Data Collection*
   a) Gathered census data (2011) in tabular format.
   b) Obtained shapefiles for Tamil Nadu and Coimbatore's administrative boundaries.
2. *Data Processing in ArcGIS Pro*
   a) Imported shapefiles and table data into ArcGIS Pro.
   b) Used geospatial joins to link census data with spatial boundaries.
3. *Map Creation and Visualization*
   a) Developed symbology maps using various visualization techniques:
   b) Choropleth maps (color-coded representations of population density, literacy rate, etc.)
   c) Graduated symbols (for economic activity, employment rates, etc.)
   d) Heatmaps (to identify high-density and low-density areas)
4. *Analysis and Interpretation*
   a) Identified spatial patterns of textile growth in and around Coimbatore.
   b) Assessed the correlation between demographic data and urban expansion.
   c) Compared to different wards/localities to get knowledge of current trends in textile industry.
5. *Results*
   a) The analysis revealed growth trends in Coimbatore belt.
   b) New innovative textile industries were found in specific areas.
   c) Degradation of some textile industries were found.
   d) Some urban redevelopment projects have been found.

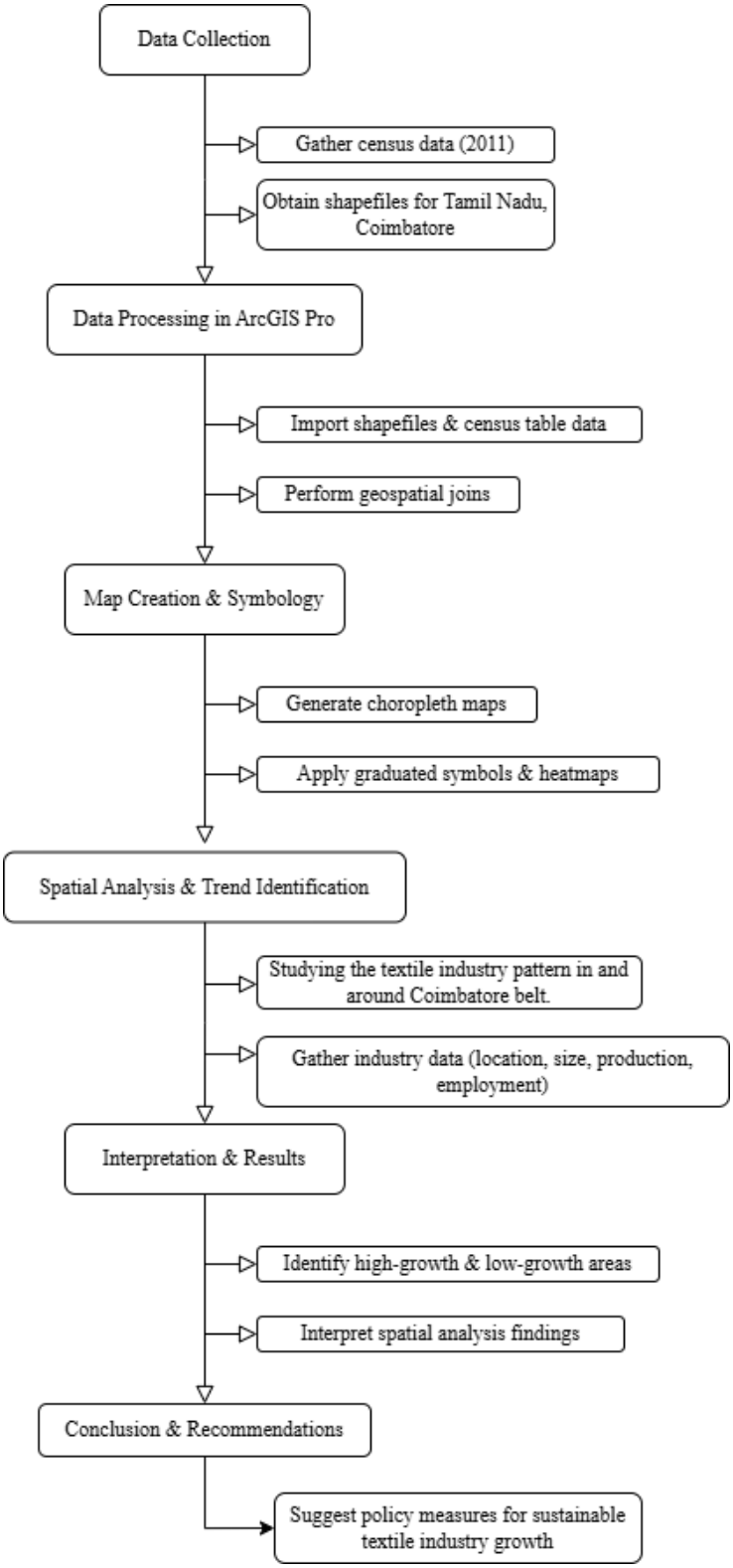

Figure 10 flowchart of methodology

MAPS FROM ARCGIS PRO

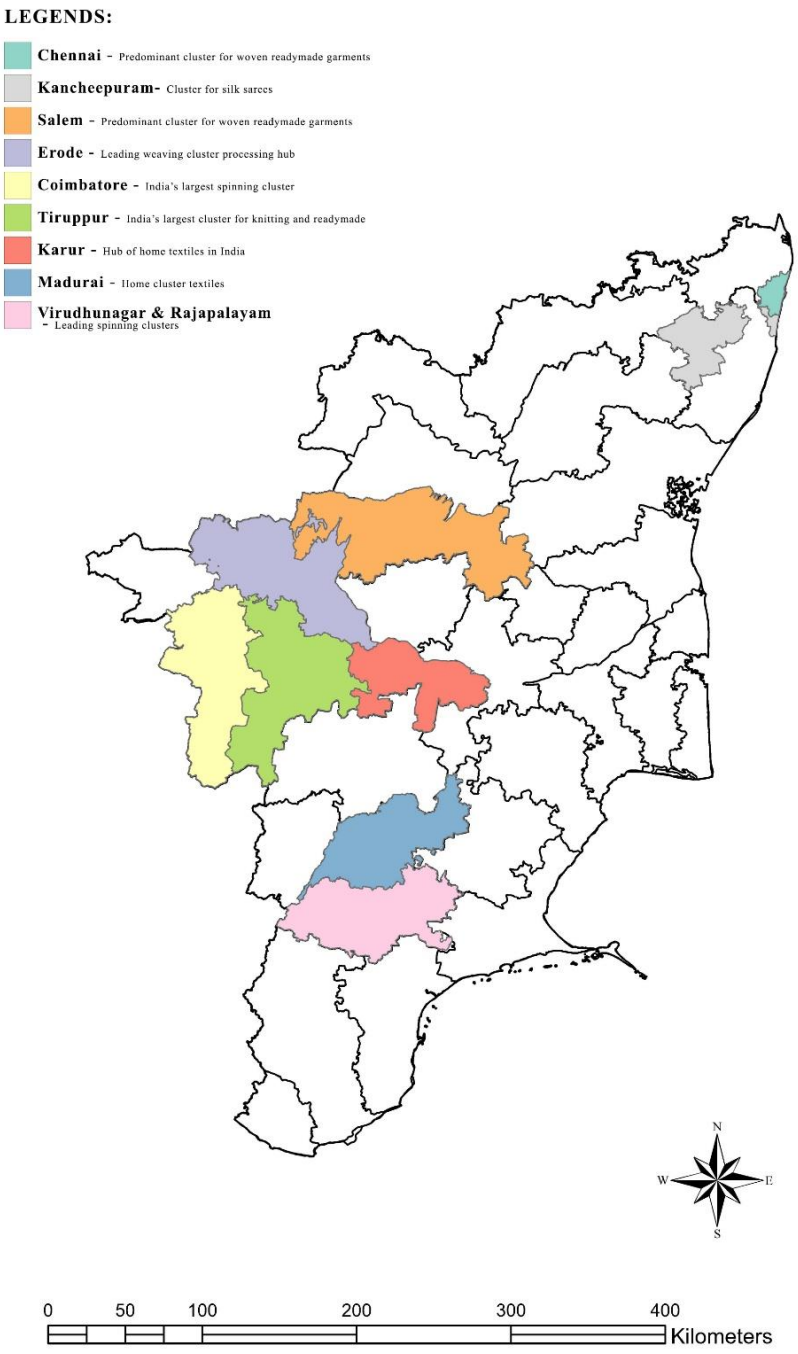

Figure 11 Textile hubs of Tamil Nadu, India.

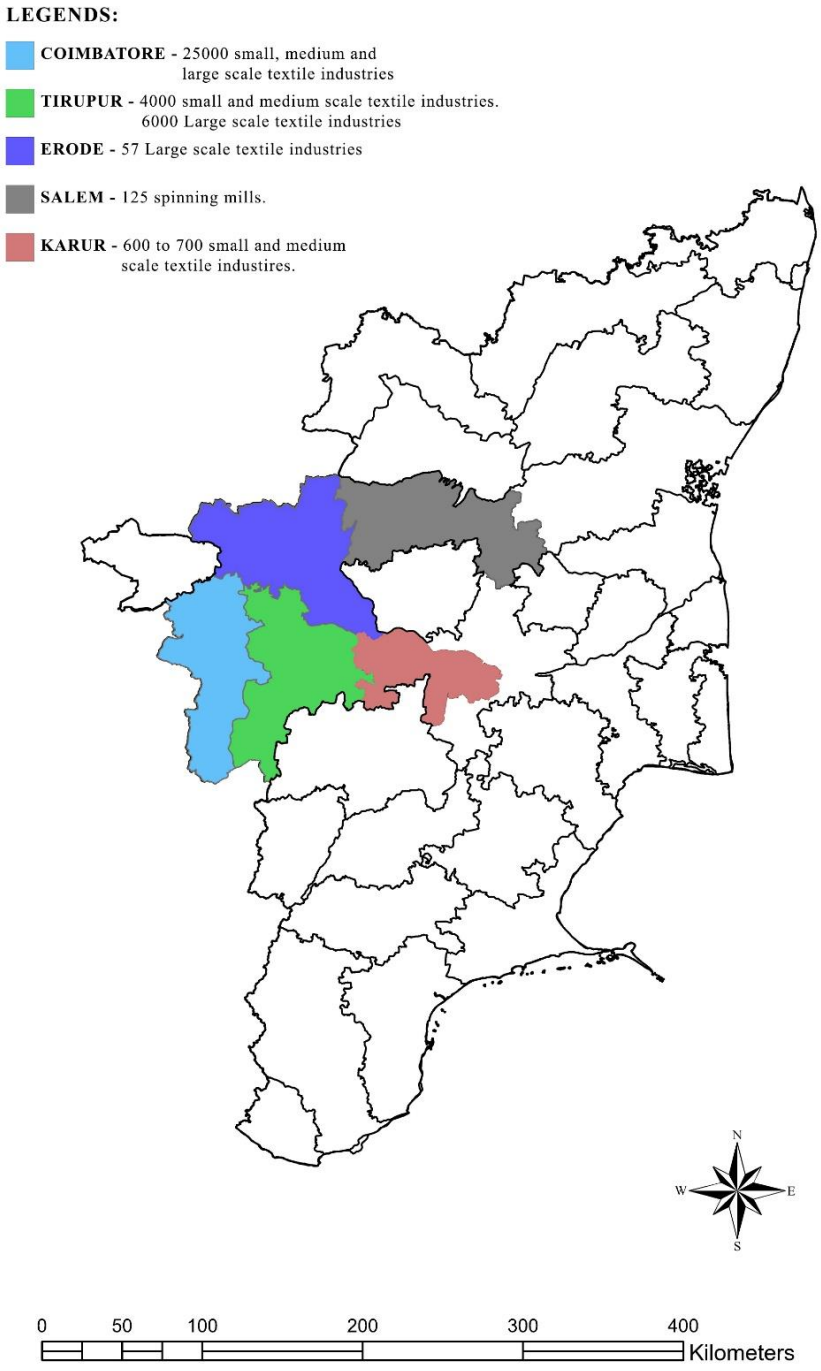

Figure 12 Number of textile industries in Coimbatore region, Tamil Nadu, India.

Lakshmi Mills Site, Coimbatore.

Figure 13 The redeveloped Lakshmi mills site in Coimbatore, Tamil Nadu, India.

THE KEY FACTORS CONTRIBUTING TO THE TEXTILE INDUSTRIES IN TAMIL NADU.

Large-scale production and small-scale handloom operations are made possible by a number of factors, including a long history of cotton cultivation, easily accessible skilled labor, well-developed infrastructure, robust cluster formations in cities like Tirupur and Coimbatore, a wide range of textile production capabilities, supportive government policies, and a favorable business environment.

a) **Availability of raw materials:** Widespread cotton farming in the state ensures convenient access to raw materials, especially in regions such as Coimbatore and Tirupur.
b) **Talent pool:** Tamil Nadu possesses a significant workforce of skilled labor, especially in the textile industry, enhancing production efficiency.
c) **Cluster formation:** Significant textile hubs such as Tirupur (knitwear), Coimbatore (spinning), and Karur (home textiles) offer specialized manufacturing skills and benefits of scale.
d) **Infrastructure:** Well-established transportation systems, port infrastructures, and energy sources promote the transfer of raw materials and finished goods.
e) **Assistance from the government:** State government programs and regulations focused on enhancing textile manufacturing and export have been vital.
f) **Varied fabric manufacturing:** Tamil Nadu possesses a robust involvement throughout the textile value chain, encompassing spinning, weaving, dyeing, printing, and garment production.
g) **Tradition of handloom:** A robust handloom tradition serves as a basis for excellent traditional textile creation.
h) **Export focus**: The sector is ideally suited for international markets because of its high quality and competitive rates.

LIMITATIONS

The mapping of Coimbatore's textile industries is limited by environmental complexity, technical limitations, and data shortages. Rapid urbanization makes geographical analysis more difficult, and the expensive cost of GIS prevents its widespread use. Dependency on outside raw sources complicates logistics. These difficulties impair resource management and sustainability initiatives by impeding precise mapping and environmental impact evaluations. To solve these problems, cooperation and policy assistance are required.

Data and Resource Constraints:

a) Lack of comprehensive, updated data on textile industries.
b) Inaccurate secondary data and lack of centralized databases.
c) Technological and Infrastructure Challenges:
d) Limited adoption of advanced technologies like GIS and remote sensing.
e) Rapid urbanization complicates distinction between industrial, residential, and commercial areas.
f) Lack of localized data and standardized methodologies for environmental impact assessments.

Economic and Policy Barriers:

a) High costs associated with GIS-based studies.
b) Limited resources of smaller textile units.
c) Dependence on raw materials from other states.

Addressing the Challenges:

a) Cooperation among governmental organizations, business partners, and educational establishments.
b) Improvement of data collection systems.
c) Enhancement of technological infrastructure.
d) Development of standardized methodologies for environmental impact as assessments.
e) Policy supports and financial incentives for advanced mapping technologies.

CONCLUSION

Finally, further research on the feasible of the textile sector in Coimbatore should concentrate on resolving the social, economic, and environmental issues that this industry faces. Projects like as ITF's 'India for SURE' blueprint and Elion's water sustainability initiative demonstrate the possibility of cooperative efforts to improve sustainability in the area.

This suggests future studies for Coimbatore's textile industry, focusing on environmental sustainability, economic viability, social responsibility, and policy framework. It suggests implementing advanced water management practices, reducing pollution, promoting renewable energy, fostering com-munity engagement, and developing supportive policies. These

strategies aim to transition the industry towards a more sustainable model, aligning with the broader goals of environmental stewardship and economic development in India and Tamil Nadu. The goal is to reduce operational costs, enhance global competitiveness, and minimize negative impacts.

the Lakshmi mills project demonstrates these adaptive reuse principles regarding industrial remnants preserve as many historic architectural and artistic features as possible provide pedestrianizing areas especially in highly congested towns to check urban sprawl and enrich economic values through a synergy of public and commercial revenue streams in one sense it acts as a bridge in that it augments rather than replaces the textile innovations of Coimbatore which is home to 42 percent of the spinning mills in Tamil Nadu, the Lakshmi mills revival illustrates how cultural buildings may tap into a physical past to combat urban fragmentation unlike the Sri Ranga Vilas textiles that involve medicinal rather than cultural work future projects should save the transferring textile fortunes of the area which are both ultimately meant as an innovator and guise of its fabricating quality balancing their efforts as a harbinger of the 245 crores directed toward investments into industrial research and development.

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