



Analyzing The Dynamics of Investment and Employment of Industries in Nagpur District

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Abstract:

This research study aims to investigate and evaluate the complex link between employment dynamics and investment patterns in the industries in the Nagpur district. Nagpur district, in the Indian state of Maharashtra, has experienced notable industrial expansion recently. Hence, it is critical to comprehend the relationship between investment and employment opportunities. The study of employment and investment dynamics in Nagpur district necessitated a thorough analysis of various factors that influence the localization of industries in the region. The study of employment and investment dynamics in Nagpur district necessitated a thorough analysis of various factors that influence the localization of industries in the region. The study employs a multifaceted approach, incorporating economic indicators such as sector-specific analysis, and employment data to provide a comprehensive understanding of the dynamics at play. It implements the descriptive statistical tool of Pearson's correlation and T-Test for hypothesis testing. Policymakers, investors, and local communities must comprehend the entry-gate relationship between investments made in different industries and the resulting influence on employment.

Keywords: Nagpur district, investment, employment, industries, economic development, sector-specific analysis.

Introduction:

Nagpur district has emerged as a credible driver in the industrial landscape of Maharashtra, attracting investment in various sectors. It has become a hub of economic activity in recent times, with a varied industrial basis that includes manufacturing, services, and technology. Understanding the dynamics of investment and employment becomes crucial for policymakers, investors, and local stakeholders as globalization reshapes the boundaries of economic activities. To shed light on the variables driving investment decisions, the resulting impact on employment patterns, and the reciprocal relationship between the two, this study aims to give a thorough analysis. This study examines the investment trend and their subsequent impact on the employment generation in the region.

Background:

Analyzing the dynamics of investment and employment in Nagpur district involved considering various factors that contribute to the localization of industries in the region. The dynamics of investment and employment are often influenced by the combination of economic, geographic, social, and political factors. Here are some key localizing factors that may impact the investment and employment landscape in Nagpur district:

- **Geographical location:** Nagpur's strategic central location in India makes it a transportation hub connecting various regions. Proximity to major cities, ports, and markets can attract industries seeking logistical advantages.
- **Infrastructure Development:** The availability of well-developed infrastructure including transportation networks industrial estates, and utilities can be a significant factor. Better infrastructure reduces operational costs and attracts enterprises.
- **Natural resources:** access to natural resources such as minerals, water, and raw materials, can influence the choices of industries in the area. Proximity to the mineral-rich regions might attract industries to depend on these resources.



- **Policy and regulatory environment:** Government policies, incentives, and ease of doing business play a crucial role. Proactive government support and a favorable regulatory environment can encourage investment and business growth.
- **Skilled labor force:** The availability of a skilled and educated workforce is essential for industries. Educational institutions and training centers in the Nagpur district contribute to the development of a competent labor pool.
- **Industrial clusters:** The presence of industrial clusters often encourages the growth of related industries. Nagpur has established clusters in certain sectors, it attracts more businesses in those domains due to the availability of the supportive ecosystem. E.g. MIHAN.
- **Market access:** proximity to domestic and international markets is a critical factor for industries that rely on easy access to consumers. Nagpur's location is advantageous for businesses targeting central and northern Indian markets.
- **Technological advancements:** The adoption of advanced technologies and innovations can make an area attractive to industries looking to modernize their operations. The focus of Nagpur district on technology and innovation can play a key role in attracting tech-oriented industries.
- **Quality of life:** The overall quality of life including, factors like housing, healthcare, and recreational facilities, can influence the retention of skilled professionals and the attractiveness of the region for both businesses and employees.
- **Environmental sustainability:** Increasingly, companies nowadays are considering environmental factors while choosing locations for their operations. If Nagpur district emphasizes sustainable practices and a green environment, it may attract industries with a focus on eco-friendly operations.
- **Global economic trend:** Global economic trends and market demands can influence the type of industries that thrive in a region. If Nagpur aligns with emerging global market needs, it may attract

investment in the sectors that are in high demand internationally.

- **Political stability:** stability in the political environment is crucial for industrial activities. A stable political climate ensures a predictable business environment and reduces the risk associated with policy changes and uncertainties.

Analyzing the interplay of these factors will provide a comprehensive understanding of why certain industries drive in Nagpur district and how they contribute to the local economy in terms of investment and employment. It is important to note that these factors are interconnected and a holistic approach is necessary for thorough analysis.

Objectives:

- 1) To analyze the investment pattern in different industries in Nagpur district.
- 2) to access the employment dynamics resulting from these investments
- 3) to identify the key sectors contributing to the economic growth and employment generation.

Review of literature:

- C, Paramasivan (2017), confesses that the Udyog Aadhaar registration is a crucial instrument for socioeconomic development as India's rural areas see increasing expansions. Designated to make registration simple and available to all Indian citizens, it was put into effect in 2006. By encouraging industries through registration, the goal is to enhance rural communities. However, to take advantage of government incentives and support, micro and small entrepreneurs must be aware of Udyog Aadhaar.

- Mishra, P. A. (2022), Nagpur, Maharashtra's second capital, ranks 13th in population and is projected to become the 5th fastest growing metropolis globally between 2019 and 2035. It serves as the Vidarbha region's governmental, educational, commercial and cultural hub. Despite having infrastructure for industrial growth, the Nagpur district has not made enough progress to claim industrial town status. Nagpur contributes to the national GDP at 13th and is the 3rd largest contributor to both GDP and GDP. It is significant hub for commerce in oranges, food manufacturing and banking services.

This research paper is intended to contribute a piece of new knowledge and perspectives to the existing dynamics of investment and employment in the Nagpur district.

Research methodology:

Data collection: A secondary data for this research paper is sourced from a socio-economic survey of Nagpur district 2023, prepared by the district statistical office, Nagpur, planning department, Maharashtra government. With the help of this economic indicators such as the number of Udyog Aadhar registered industries, total establishments, group of industries, total investment, and employment statistics can be analyzed. Spatial analysis tools and Microsoft Excel have been utilized to represent the data.

The data provided in table 1 offers an insight into the industrial landscape of the Nagpur district focusing on total establishments and the number of workers across different sectors.

Table : Employment in Various Industries Of Nagpur District

Type Of Industry	Industry groups details	Total establishments	Total establishments of District (in %)	Number of workers			Total Number of workers	Total Number of workers in District (In %)	Average workers per establishment
				Government	Semi-Government	Private			
Primary industry	Agriculture	295	9%	1264	1389	16,330	18983	8%	64.34915
	Mining	209	6%	808	1131	15,315	17254	8%	82.55502
secondary Industry	Manufacturing	215	7%	614	856	8856	10326	5%	48.02791
	Electricity production gas water and wastewater services	308	9%	1019	918	20,549	22486	10%	73.00649
	Construction	201	6%	591	486	11,092	12169	5%	60.54229
Tertiary industry	Wholesale and retail trade and hotel industry	419	13%	891	1010	21,145	23046	10%	55.00239
	Transport warehousing and communication	134	4%	704	584	8321	9609	4%	71.70896
	Financing, insurance real estate, and industry-related services	1401	43%	17,394	18794	69,656	105844	46%	75.54889
	Collective, social, and personal services	109	3%	776	729	6580	8085	4%	74.17431
	Total	3291	100%	24061	25897	177,844	227802	100%	69.21969

Source: District Statistical Journal, Nagpur, सामाजिक व आर्थिक समालोचन - 2023 (page 138)

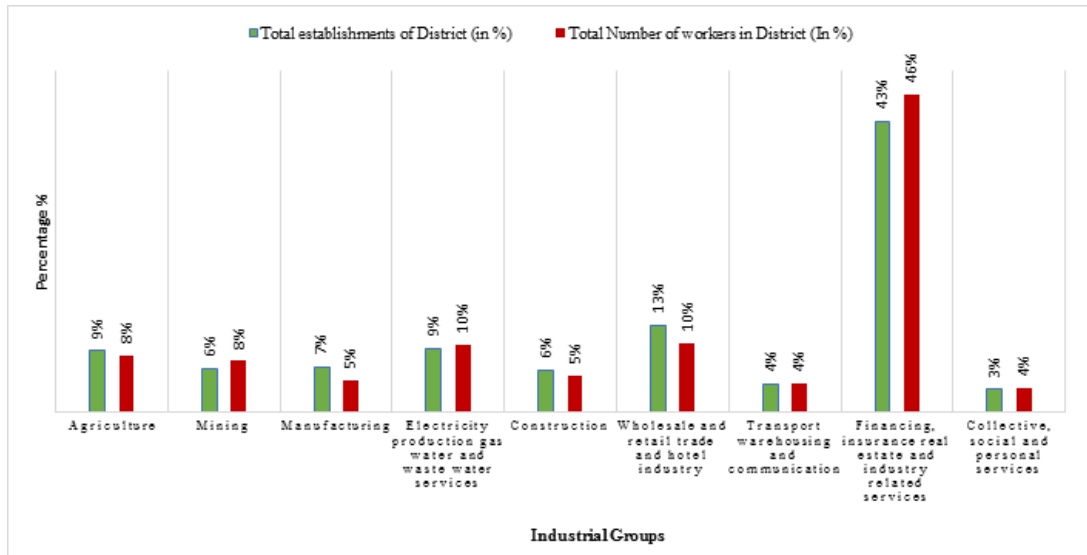
Note: Average workers per establishment = $\frac{\text{Number of workers in each industry group}}{\text{total number of industries in each group}}$

Sector-specific analysis: The research paper focuses on specific industries prevalent in the Nagpur district including manufacturing, agriculture, electricity production, information technology, and services. Each sector's contribution to investment and employment can be evaluated with the help of the district statistical journal Nagpur District 2023 (Table No. 1). In the context of this, industries can be classified into 3 groups.

- **Primary Industry:** This sector involves the extraction and production of raw materials. Ex. agricultural activities, mining of minerals and forestry-related industries, etc.
- **Secondary industry:** this group involves the processing of raw materials into finished goods encompassing manufacturing, Electricity production gas, water and wastewater services, construction activities, etc.
- **Tertiary Industry:** These are the part of service sectors providing services to the consumers. In this includes services such as transport, Wholesale, and retail trade, hotel, Financing, insurance real estate, industry-related services, tourism, etc.

Figure 1: Sector-specific Analysis of Industries In Nagpur District
Figure 2 is a diagrammatic representation of sector-wise analysis of industries and employment

Figure 1: Sector-specific Analysis of Industries In Nagpur District



calculated in percentage and tabulated via a compound bar graph.

Source: Author Self (MS Excel tool)

Note:

$$1) \text{ Total establishments of District (in \%)} = \frac{\text{Industry group}}{\text{total industries of all group}}$$

$$2) \text{ Total Number of workers in District (In \%)} = \frac{\text{Number of workers in each industry group}}{\text{total number of workers all group of industries}}$$

The most prominent sector in Nagpur district is financing, insurance, real estate, and industry-related services constituting a subsequential 43% of total establishments and employing 46% of the workforce. This dominant contribution to the district's economic activities is from financial and service-oriented industries. Electricity production holds a notable share of 9% of the establishment and 10% of the workforce indicating the importance of energy and utility services in the district's industrial setup. The construction and transportation sectors with 6% in establishments and 5% and 4% in the workforce respectively seem to have a relatively smaller impact on the overall industrial landscape. The dominance of the financial sector suggests a strong service-oriented economy in Nagpur district. Exploring the factors contributing to the dominance of the financial sector, analyzing trends in investment patterns, and investigating the potential for diversification within the industrial landscape could provide valuable insights for policymakers and investors. Understanding these dynamics within each industry can provide valuable insights for targeting policies and strategies to further enhance the positive correlation.

Table 2: Taluka-Wise Distribution Of Udyog Aadhar Registered Industries (2023)

Tehsils	Area (Km ²)	Udyog Aadhar Registered Industries	Udyog Aadhar Registered Industries (In %)	Number Of Employment (In Lakhs)	Number Of Employment (In %)	Investment (Rs. Crore)	Investment (In %)	Udyog Aadhar Registered Industries Per Km ²	average investment per industry
Bhiwapur	611.24	363	1%	1689	1%	1133	0.10%	0.593875	3.12
Hingana	792.94	2892	6%	35547	12%	141235	16%	3.647186	48.84
Kalmeshwar	503.73	838	2%	6947	2%	14425	2%	1.66359	17.21
Kamptee	392.19	1992	4%	13568	4%	43879	5%	5.079171	22.03
Katol	909.02	989	2%	5128	2%	11621	1%	1.087985	11.75
Kubi	819.71	404	1%	1984	1%	6193	1%	0.492857	15.33
Mauda	608.22	695	1%	4110	1%	13531	2%	1.142679	19.47
Nagpur (R)	645.62	25738	53%	153395	51%	504659	57%	39.86556	19.61
Nagpur (U)	217.17	9506	20%	49323	16%	91601	10%	43.77216	9.64
Narkhed	711.92	825	2%	4206	1%	7091	1%	1.158838	8.60
Parshivni	935.41	982	2%	4804	2%	8618	1%	1.049807	8.78
Ramtek	1141.56	1026	2%	5204	2%	9583	1%	0.89877	9.34
Saoner	655.14	1469	3%	11320	4%	16489	2%	2.242269	11.22
Umred	1088.74	1014	2%	5051	2%	21612	2%	0.931352	21.31
Total	9892	48733	100%	302276	100%	891670	100%	4.85746	18.30

e:

- 1) Udyog Aadhar Registered Industries (In %) = $\frac{\text{Udyog Aadhar Registered Industries in tahsil}}{\text{total industries of district}} \times 100$
- 2) Total Number of workers in District (In %) = $\frac{\text{Number of workers in each tahsil}}{\text{total Number of workers of district}} \times 100$
- 3) Total Investment in District (In %) = $\frac{\text{Investment in each tahsil}}{\text{total Investment of district}} \times 100$
- 4) Density of Udyog Aadhar Registered Industries Per Km² = $\frac{\text{Udyog Aadhar Registered Industries}}{\text{Geographical area}}$
- 5) average investment per industry = $\frac{\text{investment in Udyog Aadhar Registered Industries in each tahsil}}{\text{Udyog Aadhar Registered Industries in each tahsi}}$

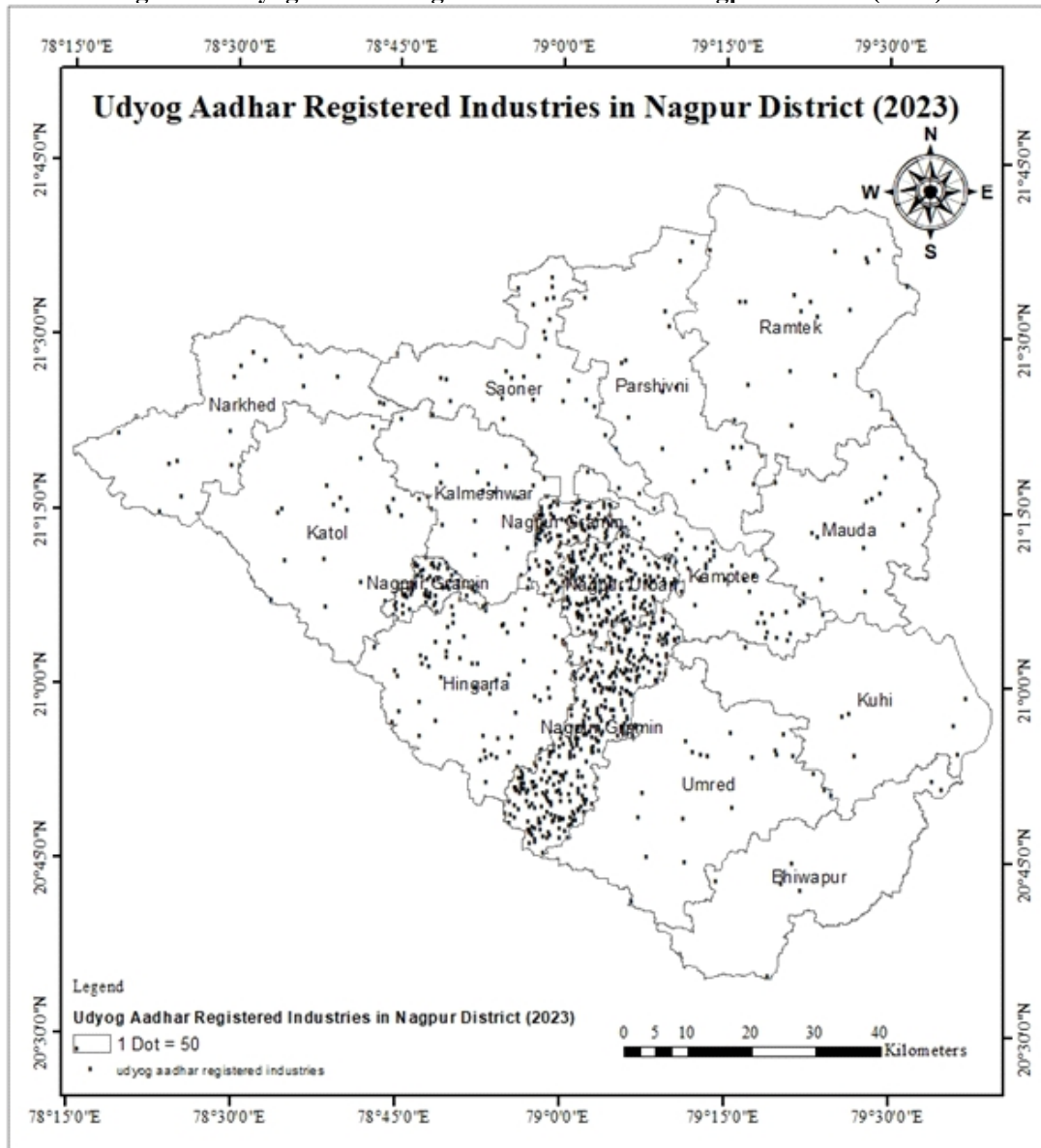
Spatial analysis: Table No. 2 highlights the tahsil-wise spatial dispersion of industries and subsequent employment across the Nagpur district. Nagpur district has attracted investment of Rs. 891670 crores with the total number of employments are 302276 lakhs working in 48733 Udyog Aadhar registered industries. There is uneven distribution of investment in various industries and resultant employment among different tahsils. The highest 53% and lowest 1% of Udyog Aadhar registered industries are situated in Nagpur rural and Bhiwapur tehsil respectively. The highest 51% and lowest 1% employment has been generated in Nagpur rural and Bhiwapur tahsil respectively. In terms of investment, the highest 57% and lowest 0.10% finance has been attracted by Nagpur rural and Bhiwapur tahsil respectively.

Average investment per industry has also been calculated which is 18.30 crore investment per Udyog Aadhar registered industry for the overall Nagpur district. The highest 48.84 and lowest 3.12 crore investment per Udyog Aadhar registered industry has been observed in Hingana and Bhiwapur Tahsil respectively.

With the investigation, it has been concluded that service-based industries contribute the most to the employment generation and transportation and communication network and their accessibility, location and availability of resources, active forces of demand and supply are the potential factors

driving this impact.

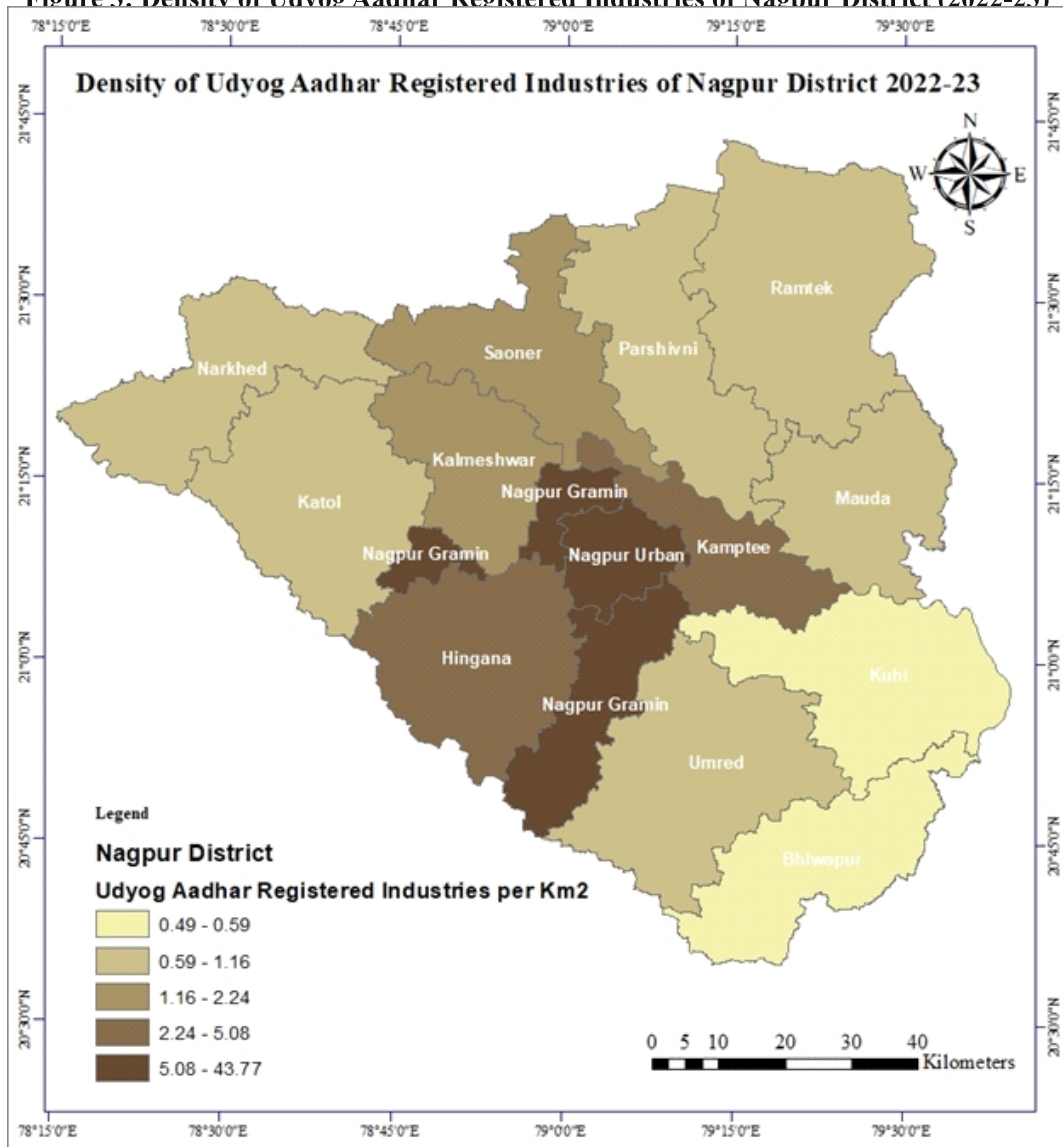
Figure 2: Udyog Aadhar Registered Industries in Nagpur District (2023)



Source: Author Self (spatial analysis tool)

Dot map of Udyog Aadhar registered industries: Dot map is a powerful visual and effective way to represent spatial dispersion of Udyog Aadhar registered industries across different tehsils in Nagpur district. The size of 1 dot is proportional to the 50 industries in each tehsil in Nagpur district which provides a quick and intuitive understanding of where economy activities are concentrated. It is clearer from the dot map that there is an uneven distribution of industrial economic activities in Nagpur district. The highest 25738 and lowest 363 of Udyog Aadhar registered industries are situated in Nagpur rural and Bhiwapur tehsil respectively.

Figure 3: Density of Udyog Aadhar Registered Industries of Nagpur District (2022-23)

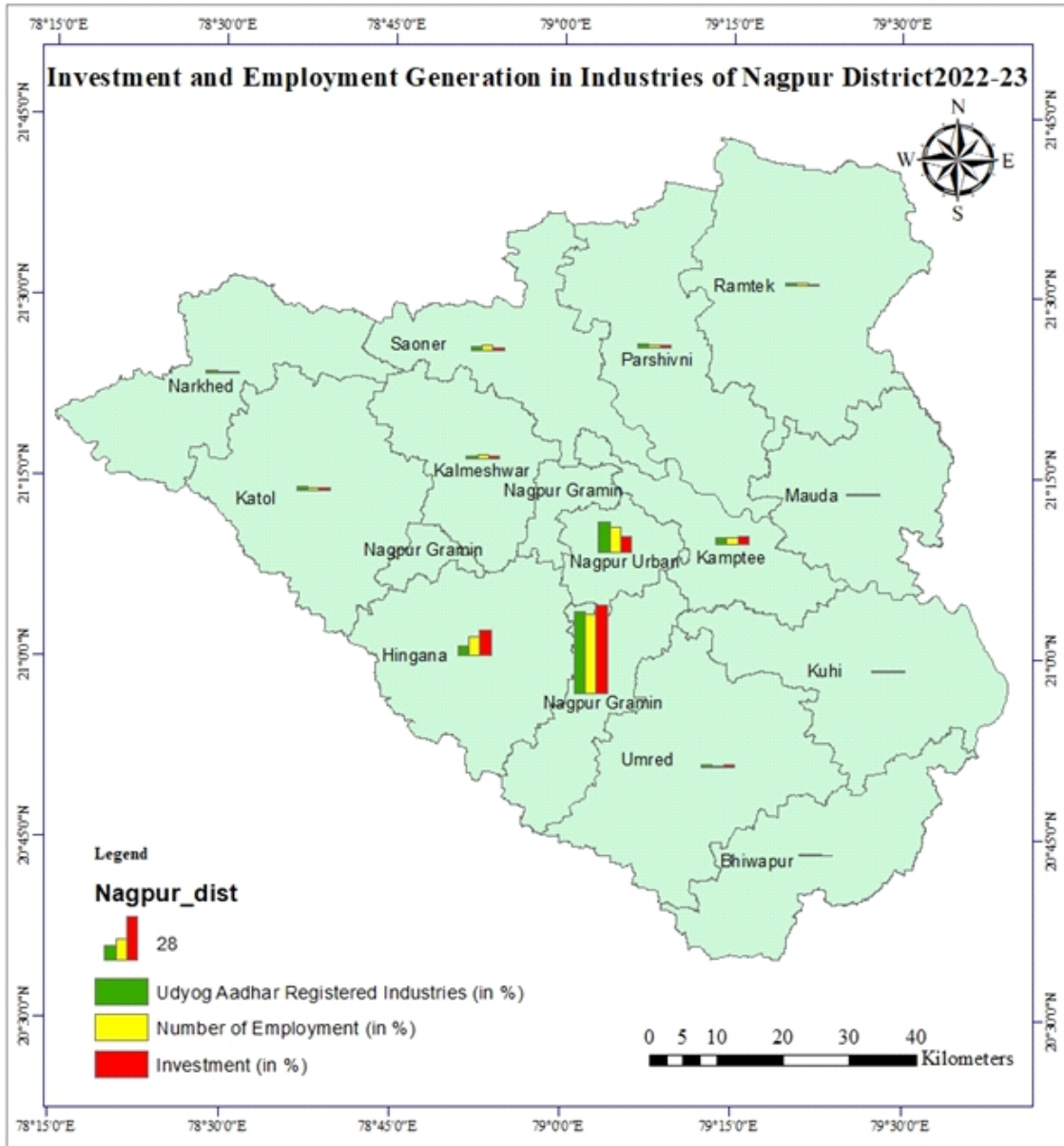


Source: Author Self (spacial analysis tool)

Density of Udyog Aadhar Registered Industries of Nagpur District (2022-23):

Udyog Aadhar registered industries per square kilometer area of Nagpur district have been projected in figure 3. The variation in density of Udyog Aadhar registered industries across different tehsil is an indicative of regional disparities in industrial development within Nagpur district. Tehsils with higher industrial densities attract more investment and contribute more to employment generation while those with lower densities needs targeted interventions for development. Industrial density per square kilometer is 5 for overall Nagpur district. Nagpur Gramin and Nagpur urban tehsil have highest while Bhiwapur and Kuhl Tahsil have lowest industrial density of overall Nagpur district. Identify the areas with higher industrial density helps to understand the factors contributing for their localization. It provides the valuable foundation for understanding dynamics of investment and employment.

Figure 4: Investment and Employment Generation in Industries of Nagpur District (2022-23)



Source: Author Self (spacial analysis tool)

Investment and Employment Generation in Industries of Nagpur District (2022-23):

Tahsil-wise distribution of Investment and Employment in Udyog Aadhar registered Industries of Nagpur District calculated in percentage are tabulated in table 2 which is represented via figure 4 projecting joint bar graph. It is a powerful visual and effective way to represent spatial dispersion of Investment and Employment in Udyog Aadhar registered industries across different tehsils in Nagpur district. Nagpur Rural stands out as a significant hub for both employment and investment despite having a lower percentage of registered industries compared to Nagpur urban tahsil. Hingana, Nagpur Urban, and Saoner show a relatively balanced distribution of industries,

employment, and investment. Bhiwapur, kuhi and Narkhed seem to have a lower presence in terms of industries, investment, and employment. The data indicates the need for a closer examination of the dynamics between rural and urban areas in Nagpur district concerning industrial development, employment generation, and investment patterns. Factors influencing higher employment and investment in certain tahsils especially in rural areas can be explored. Policy implementation for promoting balanced industrial growth across different tahsils needs to be discussed properly.

Discussion:

Correlation analysis:

Table 3: Correlation analysis

	Udyog Aadhar Registered Industries	Number Of Employment (In Lakhs)	Investment (Rs. Crore)
Udyog Aadhar Registered Industries	1		
Number Of Employment (In Lakhs)	0.990715	1	
Investment (Rs. Crore)	0.9644452	0.987897	1

Source: Author self (MS Excel)

- **Correlation between industries and employment generation:** The correlation coefficient of 0.99 indicates an extremely strong positive correlation between Udyog Aadhar registered industries and employment opportunities suggesting a high degree of linear relationship. This might suggest that the establishment and localization of industries in Nagpur district attracts people due to high wages and betterment of lifestyle.

- **Correlation between industries and investment:** The correlation coefficient of 0.96 indicates a very strong positive correlation between Udyog Aadhar registered industries and financial investment in industries. This might suggest that promoting and simplifying the registration process of industries attracts more investment leading to economic growth and increased employment in Nagpur district.

- **Correlation between employment and investment:** A correlation coefficient of 0.98 indicates a very strong positive correlation between employment opportunities and investment in various industries. This implies that promoting a conducive investment environment enhances skill development Programmes to match the industrial needs and create a supportive ecosystem for them to thrive upon. The booming investment scenario is driving job creation for fostering economic growth and contributing to the overall development of the Nagpur district.

T-Test Statistical Analysis: paired 2 samples for means results

Hypothesis:

- **Null hypothesis (H0):** There is no significant correlation between the amount of investment in industries and the level of employment generated.

- **Interpretation:** the null hypothesis suggests that there is no relationship between investment and employment implying that changes in investment do not lead to the significant changes in the employment levels.

- **Alternative hypothesis (H1):** There is a positive and statistically significant correlation between investment and employment indicating that increased investment leads to higher employment levels in industries of Nagpur district.

- **Interpretation:** the alternative hypothesis proposes that there is a positive correlation between investment and employment. in other words, as investment increases employment levels are expected to rise significantly.

Table 4: T-Test Statistical Analysis

t-Test: Paired Two Sample for Means		
Alpha	0.05	
	1133	1689
Mean	68502.84615	23122.07692
Variance	18788311956	1731429956
Observations	13	13
Pearson Correlation	0.987680404	
Hypothesized Mean Difference	0	
Degree of Freedom (df)	12	
t Stat	1.700978633	
P(T<=t) one-tail	0.057345952	
t Critical one-tail	1.782287556	
P(T<=t) two-tail	0.114691904	
t Critical two-tail	2.17881283	

Source: Author self (MS Excel)

T-statistic:

value: 1.700978633

Interpretation: the t-statistics means the difference between the sample mean and the hypothesized mean in terms of standard errors in this case the calculator value is 1.70097863.

P value:

- **P(T<=t) one-tail** = 0.057345952
- **P(T<=t) two-tail** = 0.114691904

Interpretation: The p-value is the probability of obtaining a t-statistic as extreme as the one observed, assuming that the null hypothesis is true. If p-value is less than the significant level alpha typically 0.05, the null hypothesis is rejected. In this case the one-tailed P value is 0.0573 and the 2 tailed P value is 0.1147.

Comparison with significance level (alpha):

- **alpha significance level:** 0.05.

Interpretation:

- since the p-value (0.1147) is greater than the significant level 0.05 there is not enough evidence to reject the null hypothesis. Therefore, we do not have sufficient evidence to conclude that there is a statistically significant positive correlation between investment and environment employment in Nagpur district.
- The p-value is greater than the significance level, it fails to reject the null hypothesis. In this case, there are not enough evidence to conclude that there is a significant correlation between investment and employment in Nagpur district.
- Remember, correlation does not imply casualization. Even if it finds a significant correlation,

it does not necessarily mean that increased investment directly causes higher employment. It only indicates a statistical association between the 2 variables.

Conclusion:

Conducting a sector-wise analysis of various industries helps in understanding the performance of different industries within the district and their contribution to employment and investment. The study categorized industries into primary, secondary, and tertiary sectors with financing, insurance and real estate, and industry-related services being the most prominent sectors. The financial sector contributes the most to the district's economic activity then electricity production holds a significant share of the establishment and workforce. The construction and transportation sectors have a small impact on the overall industrial landscape. The dot map of Udyog Aadhaar registered industries provides a visual representation of the distribution of economic activities in the district. The density of registered industries across different sources indicates regional disparities in industrial development in the district. Density attracts more investment and contributes more to the employment generation, while those with lower densities need targeted interventions of the development full for development. Tahsil-wise distribution of Investment and Employment in Udyog Aadhaar registered Industrial analysis provides a valuable insight into the distribution of Udyog Aadhaar registered industries, employment, and investment across various tahsils in Nagpur district forming a solid foundation for the policymakers on the dynamics of investment and employment in the region. The study also finds a strong positive correlation between industries and employment generation suggesting that the establishments and localization of industries in Nagpur district attract people due to high wages and better lifestyle. Additionally promoting a conducive investment environment enhances skill development programs to match industrial needs and create a supportive ecosystem to thrive upon.

Based on the T-Test Statistical Analysis, it failed to reject the null hypothesis. There is not enough statistical evidence to support the claim that there is a positive and significant correlation between investment and employment in industries in the Nagpur district at the 0.05 significance level. Even if a strong link is discovered, this does not imply that higher investment inevitably leads to higher employment. All it shows is that there is a statistical correlation between the two variables.

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