

Abstract

Corridor-induced industrial growth plays crucial role as a significant driver of built-up expansion, reshaping urban growth types, forms, and spatial patterns in Tier-II cities. Globally, the rapid pace of urbanisation has significantly accelerated urban growth in both developed and developing countries. Urbanisation and industrial development acting as mutually reinforcing processes that transform city's structure and character. Corridor development has a decisive effect on the transformation of surrounding regions and cities and influences overall urban growth patterns and Land Use Land Cover (LULC) transformation processes. This study examines the influence of industrial growth as a key economic stimulus shaping urban growth dynamics, interpreted through spatio-temporal urban transformation processes, patterns, and phenomena, as well as LULC change, in selected Tier-II industrial Indian cities-Surat and Jodhpur, using Remote Sensing (RS) data and Geographic Information System (GIS) tools. Both internal and external drivers, along with process-pattern mechanisms, are considered to understand how industrial expansion shapes urban growth patterns, forms, and typologies.

An integrated set of spatial and statistical methods is applied to evaluate these dynamics and classify urban taxonomy. Built-up dynamics are quantified using the Normalised Difference Built-up Index (NDBI), while urban growth intensity and expansion typologies are characterised using the Urban Expansion Intensity Index (UEII) and Landscape Expansion Index (LEI). The relationship between industrial development and built-up growth is assessed through Pearson's correlation analysis, and the degree of urban sprawl is measured using Shannon's Entropy Index. LULC patterns are delineated using the Maximum Likelihood Classification (MLC) method and future urban growth trajectories are simulated using a Cellular Automata-Artificial Neural Network (CA-ANN) model to evaluate the influence of industrial typologies on urban expansion patterns. Subsequently, spatial correlation analysis is used to examine the influence of industrial typologies on patterns of urban morphological transformation and urban growth types.

The results reveal distinct industry-driven spatial growth patterns corresponding to different stages of industrial development, with Surat exhibits mature and continuous, corridor-oriented rapid growth and Jodhpur demonstrates emergent, dispersed expansion transitioning towards continuity. The study identifies industry-driven spatial growth patterns, projects future development trajectories for both study areas based on their stages of industrial development. Further, it develops a comprehensive framework for analysing industrial-induced urban morphological transformation for sustainable urban and industrial planning in rapidly industrialising Tier- II cities.

Keywords: Corridor Development, Industrial Growth, Built-up Growth, Urban Growth Types, Urban Morphology, Land Use Land Cover