

Title: Transforming landscapes: Decoding the impact of universities on urbanization using advanced modeling and perception analysis

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Abstract: Universities play a crucial role in urban economic and structural development. The government of Bangladesh has undertaken the initiative to establish a public university in each of the 64 districts. These newly founded universities have the potential to impact urban growth significantly. We aimed to project university-induced urban expansion to address this knowledge gap and identify the mechanisms driving urban growth. The classification of supervised and unsupervised methods was employed to analyze urban development for the years 2000, 2010, 2016, and 2022. We used the Cellular Automata and Markov Chain approach to forecast future urban growth and land transition capacity. Additionally, the driving factors and selection of the study area were derived from Focus Group Discussions (FGD), Key Informant Interviews (KII), Probit Model, and Perception Index (PI). The findings of this study reveal a 1.6% urban growth rate within ten years of the establishment of the university, while urban expansion accelerated to 29.78% after ten years. The predictions also indicate a sustained urban growth rate of 4.7% by 2042. Furthermore, the PI index demonstrates that the establishment of the university has resulted in high demand for rental housing, serving as one of the primary drivers of urban expansion. Moreover, the Probit model highlights strong economic capability, proximity to the town, railway station, hospital, and easy access to credit as vital facilitators behind the drivers of urban expansion. Policymakers, the scientific community, and urban planners can benefit from this study in pursuing sustainable city development through university establishment.

Keywords: University-Induced Urban Expansion Urban Growth Modeling Cellular Automata–Markov Chain (CA–MC) Land Use Change Probit Model Perception Index (PI) Bangladesh District Universities

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