

Human Capital as a Catalyst in the Urbanization–Economic Growth Nexus: Evidence from Pakistan (1991-2022)

¹Dr. Kamran Ali Abbasi

²Dr. Sahrish Taj

³Dr. Faisal Nadeem Shah

¹Department of Economics, Shah Abdul Latif University, Khairpur, Sindh, Pakistan.

²Shaheed Mohtarma Benazir Bhutto Medical University (SMBBMU), Larkana, Sindh, Pakistan.
National College of Business Administration

³Lecturer, Department of Economics, University of Sargodha, Sargodha.

kamranaliabbasi4@gmail.com, sahrish.taj@gmail.com, Faisal.nadeem@uos.edu.pk

Abstract

The rapid expansion of urban populations worldwide has heightened the need for sustainable urban development strategies that can effectively support long-term economic growth. Consequently, scholarly interest in the urbanization–economic growth relationship has intensified, with emerging evidence suggesting that the growth implications of urbanization are not uniform but depend on the influence of key macroeconomic conditions. Despite Pakistan being among the fastest urbanizing economies globally, empirical research examining the urbanization–growth nexus remains limited, particularly with respect to the role of moderating macroeconomic factors. Against this backdrop, this study investigates the extent to which human capital development (HCD) conditions the relationship between urbanization and economic growth in Pakistan. Using annual time-series data covering the period from 1991 to 2022, the analysis employs the autoregressive distributed lag error correction model (ARDL–ECM) to estimate both short- and long-run dynamics. To ensure the robustness of the results, the dynamic ordinary least squares (DOLS) technique is also applied. The empirical findings indicate that urbanization, when considered in isolation, does not significantly enhance economic growth. However, the interaction between urbanization and human capital development yields a positive and statistically significant effect, implying that improvements in human capital offset the potential adverse consequences of rapid urban expansion. These results underscore the importance of integrating human capital investment into urban development strategies. Accordingly, the study recommends the formulation of urban policies aimed at fostering well-managed cities capable of leveraging agglomeration economies, alongside sustained investments in education and healthcare to strengthen human capital and promote inclusive urban-led economic growth.

Keywords: Urbanization, Economic growth, Mediating role, Human capital development, Education

Article Details:

Received on 29 Dec, 2025

Accepted on 26 Jan, 2026

Published on 27 Jan, 2026

Corresponding Authors*

1. Introduction

Rapid urban expansion has become one of the most defining structural transformations of the twenty-first century, reshaping economic systems, social relations, and development trajectories across both developed and developing economies (Turok et al., 2023). The continuous movement of populations from rural to urban areas has intensified the concentration of economic activity in cities, elevating urbanization to a central position in global development policy discussions. This importance is formally recognized in the Sustainable Development Goals (SDGs), particularly Goal 11, which emphasizes the creation of inclusive, safe, resilient, and sustainable cities. Progress toward this goal is closely intertwined with other SDGs, highlighting the cross-cutting role of urbanization in achieving economic growth, social inclusion, and environmental sustainability (Cervantes Puma et al., 2024). As a result, the pace and quality of urbanization in developing countries have attracted growing attention from researchers and policymakers alike.

A substantial body of literature has examined the developmental consequences of urbanization, focusing on outcomes such as environmental quality, public health, food security, poverty alleviation, and economic performance (Hatab et al., 2019). Among these, the relationship between urbanization and economic growth has received particular emphasis, given the critical role of sustained growth in improving living standards and reducing poverty. From a theoretical perspective, urbanization is often associated with positive growth effects through agglomeration economies, knowledge spillovers, enhanced labor productivity, and the expansion of consumer and labor markets (Ngcamu, 2022). However, empirical findings remain inconclusive. While some studies report that urbanization stimulates economic growth, others find weak or negative effects, especially in developing economies where rapid urban growth often outpaces infrastructure provision, institutional capacity, and human capital accumulation (Hatab et al., 2019).

In response to these mixed results, an emerging strand of the literature argues that the economic impact of urbanization is conditional rather than automatic (Chen et al., 2022). This perspective suggests that the growth-enhancing potential of urbanization depends on the presence of supportive macroeconomic and structural factors that enable cities to function efficiently. Previous studies identify several factors that may shape the urbanization-growth relationship, including infrastructure development, institutional quality, foreign direct investment, technological diffusion, natural resource endowments, and human capital development. Building on this conditional framework, the present study focuses on human capital development (HCD) as a key moderating factor in the urbanization-economic growth nexus.

Pakistan offers a particularly relevant case for examining this relationship. The country has experienced rapid urbanization over recent decades, driven by population growth, rural-urban migration, and the expansion of major metropolitan areas such as Karachi, Lahore, and Islamabad. The urban share of Pakistan's population has increased steadily, and the country is projected to remain among the fastest urbanizing nations in South Asia in the coming decades. Despite this trend, Pakistan's economic growth has been characterized by volatility, structural constraints, and periodic slowdowns (Batool et al., 2023). The coexistence of accelerated urban expansion and inconsistent growth performance raises important questions about whether urbanization has effectively contributed to economic development or whether structural deficiencies have limited its growth potential.

Empirical evidence on the macroeconomic effects of urbanization in Pakistan remains limited and fragmented (Khan & Younas, 2019). Existing studies offer conflicting conclusions, with

some suggesting that urbanization has supported economic growth through industrialization and service-sector expansion, while others highlight the negative consequences of unplanned urban growth, including congestion, environmental degradation, informal settlements, and pressure on public services. These divergent findings indicate that the urbanization–economic growth relationship in Pakistan may be influenced by underlying conditioning factors that have not been adequately explored in previous research (Ahmad, 2022).

Human capital development occupies a central position in this context. Growth theory emphasizes education, skills, and health as fundamental drivers of productivity, innovation, and long-term economic expansion. In urban settings, human capital enhances the ability of workers and firms to benefit from agglomeration economies, technological progress, and market integration (Gomes, 2024). Moreover, higher levels of human capital strengthen labor market efficiency, attract investment, and increase the income-generating capacity of urban populations. Consequently, the extent to which urbanization translates into economic growth is likely to depend on the quality of human capital available within cities.

In Pakistan, however, human capital indicators remain relatively weak compared to global and regional benchmarks. Educational attainment, particularly at the secondary and tertiary levels, is constrained by low enrollment and completion rates, while skill mismatches persist in urban labor markets. Health outcomes also present significant challenges, with disparities in access to healthcare services and persistent public health concerns affecting labor productivity. These limitations suggest that rapid urbanization in the absence of adequate investment in human capital may fail to deliver its expected economic benefits and could even exacerbate existing development challenges (Chen et al., 2022; Omodero, 2019).

Against this backdrop, this study reassesses the urbanization–economic growth nexus in Pakistan by explicitly examining the moderating role of human capital development. By adopting a trivariate analytical framework, the study seeks to determine whether improvements in human capital can enhance the growth impact of urbanization and help explain the mixed empirical evidence observed in the Pakistani context. In doing so, the study contributes to the broader literature on conditional urbanization effects and offers policy-relevant insights for promoting sustainable urban-led growth in developing economies. The remainder of the paper is organized as follows. Section 2 reviews the relevant literature, Section 3 outlines the methodology and presents the empirical findings, and Section 4 concludes with policy implications and recommendations.

2. Literature Reviews

2.1. Theoretical Review

2.1.1. Endogenous Growth Theory and Urbanization in Pakistan

Endogenous growth theory provides a suitable analytical framework for understanding the long-run growth process in developing economies such as Pakistan, where structural transformation, demographic transition, and institutional quality play decisive roles. (Batool et al., 2023) Unlike neoclassical growth theory, which treats technological progress as exogenously determined, endogenous growth theory explains sustained economic growth through internally generated factors such as human capital accumulation, innovation, and knowledge spillovers. These mechanisms are particularly relevant for Pakistan, where growth outcomes are closely linked to education, labor productivity, and urban-based economic activities.

A central premise of endogenous growth theory is that investments in human capital, technological capability, and institutional development generate positive externalities that enhance productivity and support increasing returns to scale. In the Pakistani context, rapid

rural–urban migration has intensified the concentration of labor, firms, and knowledge in urban centers such as Karachi, Lahore, and Islamabad. These cities function as hubs of industrial production, services, and innovation, reinforcing the role of urbanization as a catalyst for endogenous growth through agglomeration economies and learning externalities (Batool et al., 2023).

Drawing on the foundational work of (Hatab et al., 2019; Socol et al., 2025)] formalized human capital as a key driver of economic growth, emphasizing that productivity gains arise primarily from investments in education and skills rather than physical capital alone. This argument holds particular relevance for Pakistan, where disparities in educational attainment and skill development remain significant constraints on growth. According to the endogenous human capital framework, improvements in education, health, and vocational training enhance labor productivity and facilitate knowledge diffusion, thereby strengthening the growth impact of urbanization (Ahmad, 2022). The theory further posits that economic growth is strongly dependent on the productive capacity of the population, which is shaped by the quality of human capital. Empirical studies have measured human capital using indicators such as schooling, work experience, and health outcomes (Guan et al., 2024). In Pakistan, where a large proportion of the labor force is young but under-skilled, urbanization without commensurate investment in human capital risks generating congestion, informal employment, and productivity losses rather than sustained growth (Islam et al., 2022).

Urban economic models developed by (Mill, 2019) complement Lucas' framework by highlighting the productivity advantages of cities. Building on these models, (Hu et al., 2023) demonstrate that city-level productivity depends largely on human capital concentration. Applied to Pakistan, this suggests that cities with higher levels of education and skill intensity are more likely to generate growth-enhancing spillovers. Consistent with the argument, firms in Pakistan tend to cluster in urban areas despite higher land and operating costs, driven by access to skilled labor, markets, infrastructure, and information networks (Prasetyo & Kistanti, 2020).

Thus, from an endogenous growth perspective, urbanization influences economic growth in Pakistan primarily through the human capital channel (Rehman & Rehman, 2022). Urban areas provide the spatial platform for learning, innovation, and productivity enhancement, while human capital development conditions the extent to which urbanization translates into sustainable economic growth. Accordingly, this study adopts the endogenous human capital growth framework to empirically examine the interrelationship between urbanization, human capital development, and economic growth in Pakistan.

2.2. Empirical Review: Evidence from Pakistan and Related Economies

The empirical relationship between urbanization and economic growth has been widely investigated (Montenegro Neyra, 2019); however, findings remain inconclusive, particularly for developing countries. In Pakistan, urbanization has accelerated rapidly over recent decades, raising critical questions about its contribution to economic performance. Several studies provide evidence that urbanization supports economic growth in Pakistan (Rehman & Rehman, 2022). (Channa & Lohmeier, 2025) show that urbanization positively affects output growth, particularly when complemented by human capital development. Their findings suggest that education and skill formation significantly enhance the growth elasticity of urbanization, highlighting the importance of human capital as a conditioning factor. Similarly, studies on South Asian and developing economies—whose structural characteristics closely resemble Pakistan—report a positive urbanization–growth relationship driven by agglomeration economies and labor market efficiency (Mehboob et al., 2025).

However, other studies caution that urbanization does not automatically translate into economic growth (Mehboob et al., 2025). Research on developing economies indicates that rapid urban population growth without adequate infrastructure, employment opportunities, and institutional capacity may constrain productivity and dampen growth outcomes. In Pakistan, unplanned urban expansion has been associated with rising informality, housing shortages, and environmental degradation, which may weaken the growth benefits of urbanization (Bozbura et al., 2007; Prasetyo & Kistanti, 2020).

Evidence from Pakistan and other comparable developing countries further underscores this concern. Beihai & Akhtar (2023) document growth-inhibiting effects of urbanization, attributing them to inadequate infrastructure and weak institutional frameworks—challenges that are also prevalent in Pakistan. These findings suggest that the quality of urbanization, rather than its scale alone, determines its growth impact. Recent empirical work emphasizes the role of mediating variables in shaping the urbanization–growth nexus. Ahmad (2022) identify natural resource endowments as a mediating factor in China, while Batool et al. (2023) argue that infrastructure quality and institutional effectiveness are critical for translating urban expansion into economic growth in developing regions. In the Pakistani context, these arguments imply that deficiencies in education systems, urban governance, and public service delivery may limit the productivity gains associated with urbanization.

Despite growing empirical interest, the literature on Pakistan remains limited in two key respects. First, most existing studies examine the direct effect of urbanization on economic growth, neglecting the underlying transmission mechanisms (Hatab et al., 2019). Second, there is a notable absence of empirical research explicitly testing the mediating role of human capital development in the urbanization–growth relationship (Liu et al., 2024). Addressing these gaps, the present study contributes to the literature by empirically investigating how human capital development mediates the impact of urbanization on economic growth in Pakistan.

Table 1: Measurement Variables

Variables	Code	Definition	Unit of Measurement
GDP	GDP	Gross Domestic Product (constant LCU)	Naira
URBG	URBG	Urban population growth rate (annual)	Percentage
SCHL	SCHL	Gross primary school enrolment	Percentage
TRADE	TRADE	Trade (% of GDP)	Percentage
LFORCE	LFORCE	Labour force	Percentage
GEXP	GEXP	General government final consumption expenditure (% of GDP)	Percentage

3. Methodology

3.1. Theoretical Framework and Modelling Strategy

Grounded in the endogenous growth paradigm, this study conceptualizes economic growth as an internally driven process shaped by capital accumulation, human capital formation, and productivity-enhancing spillovers (Mehboob et al., 2025). Within this framework, the empirical specification is based on the augmented AK growth model, where aggregate output is produced using physical capital and labor under constant returns to scale. Formally, output is expressed as a function of capital and labor, with technology capturing productivity differences across time.

To reflect the role of human capital emphasized by (Gennaioli et al., 2013), labor is adjusted to account for differences in skills and knowledge. Human capital is assumed to be embodied

in the labor force and to enhance labor efficiency by improving productivity and facilitating knowledge spillovers. Consequently, effective labor is defined as the interaction between human capital and labor input. This adjustment allows human capital to influence growth indirectly through technological advancement and learning externalities.

After transforming the augmented production function into logarithmic form, economic growth is modeled as a linear function of technology, physical capital, labor, and human capital (Luqman & Antonakakis, 2021). In this formulation, growth is endogenously determined by capital accumulation and improvements in human capital, consistent with the core propositions of endogenous growth theory. The framework therefore, provides a theoretical basis for examining how urbanization interacts with human capital development to influence economic growth in Pakistan.

3.2. Variable Measurement and Data Description

To achieve the study's objectives, annual time-series data for Pakistan covering the period 1991–2024 are employed. All variables are obtained from the World Bank's World Development Indicators database to ensure consistency and reliability. Variable selection and measurement follow established empirical literature on urbanization and growth in developing economies. Economic growth is proxied by real gross domestic product (GDP), measured in constant local currency units. Urbanization is captured using the annual urban population growth rate, reflecting the pace at which Pakistan's population is concentrating in urban areas. Human capital development is represented by the education dimension, proxied by gross primary school enrollment. While human capital encompasses both education and health, education is emphasized due to data availability and its central role in skill formation in Pakistan. To mitigate omitted-variable bias and ensure a robust growth specification, additional control variables are included. Trade openness is measured as the ratio of total trade to GDP, capturing Pakistan's integration into the global economy. Labor force participation represents the supply of labor available for productive activities, while general government final consumption expenditure accounts for the role of public spending in economic performance. A detailed description of all variables and their units of measurement is provided in Table 1.

3.3. Estimation Technique and Model Specification

3.3.1. Unit Root and Cointegration Analysis

In time-series econometric analysis, the selection of an appropriate estimation technique depends critically on the statistical properties of the data. In particular, the order of integration of the variables and the existence of long-run equilibrium relationships must be established to avoid biased and misleading results. Non-stationary time-series data may produce spurious regressions, where statistically significant relationships are observed despite the absence of any meaningful economic linkage. Stationarity is assessed using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. These tests examine whether the variables revert to their long-run mean over time or exhibit persistent trends. The ADF test is specified to account for serial correlation through lagged difference terms, while the PP test provides robustness against heteroskedasticity and autocorrelation in the error structure. Given that the variables exhibit mixed orders of integration—stationary at either level or first difference—the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration is adopted. This method is particularly suitable for small samples and allows for a combination of $I(0)$ and $I(1)$ variables. The functional relationship between economic growth, urbanization, human capital, and control variables is specified accordingly. Furthermore, examine whether human capital conditions the effect of

urbanization on economic growth, an interaction term between urbanization and education is incorporated into the model. This specification enables an assessment of whether improvements in education mitigate or amplify the growth impact of urban population expansion in Pakistan.

4. Empirical Results

4.1. Descriptive Statistics

Before estimation, descriptive statistics are used to summarize the key characteristics of the data. The results indicate that Pakistan’s average real GDP over the study period reflects a relatively modest level of economic development, consistent with its classification as a lower-middle-income country. In contrast, the urban population growth rate is comparatively high, confirming the rapid pace of urbanization documented in the literature.

Primary school enrollment averages above 90 percent, suggesting substantial progress toward universal basic education. However, this improvement coexists with structural weaknesses in higher education and technical skill development. Trade openness remains moderate, indicating limited integration with international markets, while labor force participation reflects persistent unemployment and underemployment challenges. Government consumption expenditure shows notable variation over time, highlighting fluctuations in fiscal policy stance. Overall, the descriptive evidence points to a structural imbalance in Pakistan, where rapid urban expansion is not matched by commensurate economic growth, raising important questions about the quality and productivity of urbanization.

Table 2: Descriptive Analysis

Variables	Mean	Median	Max.	Min.	S.D.	JB (prob)	Obs
GDP	26.39	26.43	27.01	25.76	0.47	3.35 (0.169)	32
URBG	4.44	4.24	5.01	3.84	0.38	3.38 (0.184)	32
SCHL	91.11	90.67	102.11	78.66	6.55	0.81 (0.666)	32
TRADE	32.17	33.87	53.28	9.14	12.29	1.66 (0.437)	32
LFORCE	52.78	52.74	53.98	51.80	0.57	1.21 (0.546)	32
GEXP	4.58						

4.2. Unit Root and Cointegration Results

The results of the ADF and PP tests confirm that the variables are integrated of mixed order, justifying the use of the ARDL bounds testing approach. The bounds test results indicate the presence of a long-run cointegrating relationship among economic growth, urbanization, human capital, and the control variables. This finding suggests that the variables move together over time and share a stable long-run equilibrium relationship.

Table 2: ARDL Model

Variables	ADF (Level)	Test	ADF (1st Difference)	Test	PP (Level)	Test	PP (1st Difference)	Test
GDP	-0.8608		-4.0387***		-4.3330***		-10.9373***	
URBG	-1.9509		-5.8344***		-1.9716		-5.8327***	
SCHL	-3.0597**		-4.8146***		-1.6625		-4.4625***	
TRADE	-2.3285		-7.4764***		-2.2390		-8.1034***	
GEXP	-0.6323		-6.5931***		-0.6726		-6.6046***	
LFORCE	2.6721		-3.3965**		-0.8801		-1.6367	

4.3. ARDL-ECM Results

The ARDL estimation results reveal that urbanization exerts a statistically significant negative effect on economic growth in both the short and long run. This suggests that, in

Pakistan, rapid urban population growth has not translated into productivity gains, likely due to unplanned urban expansion, infrastructure deficits, and labor market inefficiencies. Human capital, proxied by primary school enrollment, also shows a negative relationship with economic growth. Although counterintuitive, this result may reflect inefficiencies in the education system, skill mismatches, and the limited contribution of basic education to productivity-enhancing activities. Moreover, increased school enrollment may temporarily reduce labor market participation, thereby dampening short-run growth.

Crucially, the interaction term between urbanization and education is positive and statistically significant. This indicates that human capital development moderates the adverse impact of urbanization on economic growth. In other words, while urbanization alone does not promote growth in Pakistan, its interaction with education enhances productivity and output. This finding supports the complementarity hypothesis, which argues that urbanization yields growth dividends only when supported by adequate human capital. Among the control variables, government expenditure and labor force participation positively influence economic growth, underscoring the importance of effective fiscal policy and labor market engagement. Trade openness, although positive, is statistically insignificant, reflecting structural constraints in Pakistan's external sector.

Diagnostic tests confirm the robustness of the model, indicating no evidence of serial correlation, heteroskedasticity, or functional form misspecification. Stability tests further demonstrate that the estimated parameters remain stable over the sample period.

4.4. Robustness Check

To validate the robustness of the findings, the Dynamic Ordinary Least Squares (DOLS) technique is employed. This method addresses potential endogeneity and simultaneity bias by incorporating leads and lags of differenced regressors. The DOLS results corroborate the ARDL findings, reinforcing the conclusion that education mitigates the negative growth effects of urbanization in Pakistan.

Table 4: Bound Cointegration Test

Level of Significance	Lower Bound I (o)	Upper Bound I (1)
10%	1.75	2.87
5%	2.04	3.24
2.5%	2.32	3.59
1%	2.66	4.05

F-statistic: 4.08

Number of regressors (K): 6

Table 5: Short-Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob. Value
Δ URB	-0.4889**	0.1680	-2.9098	0.0334
Δ (URB(-1))	-0.8365***	0.1360	-6.1498	0.0017
Δ SCHL	-0.0344***	0.0087	-3.9839	0.0105
Δ (SCHL(-1))	-0.0410***	0.0068	-5.9963	0.0019
Δ (URB*SCHL)	0.0075**	0.0020	3.8244	0.0123
Δ (INTER(-1))	0.0085***	0.0015	5.5958	0.0025
Δ (TRADE)	0.0010**	0.0004	-2.6420	0.0459
Δ (TRADE(-1))	-0.0035***	0.0006	-5.7093	0.0023
Δ GEXP	0.0569***	0.0092	6.1631	0.0016
Δ (GEXP(-1))	-0.0701***	0.0125	-5.6181	0.0025
Δ LFORCE	1.5951***	0.2394	6.6622	0.0012

$\Delta(LFORCE(-1))$	-0.5694**	0.1644	-3.4627	0.0180
ECT(-1)	-0.3332***	0.0421	-7.9241	0.0005

Table 6: Long-Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob. Value
URB	-1.8409**	0.6223	-2.9583	0.0316
SCHL	-0.1245**	0.0358	-3.4810	0.0176
(URB*SCHL)	0.0270**	0.0077	3.5111	0.0171
TRADE	0.0092	0.0058	1.5917	0.1723
GEXP	0.4140***	0.0348	11.8862	0.0001
LFORCE	0.5268***	0.0601	8.7623	0.0003

Table 7: Diagnostic Tests

Test	Statistic	Prob. Value
Breusch-Godfrey Serial Correlation Test	112.82	0.0705
Breusch-Pagan-Godfrey Heteroskedasticity	2.7765	0.1661
Jarque-Bera Normality Test	0.6512	0.7221
Ramsey RESET Test	0.4581	0.5095

5. Discussion and Conclusion

This study examines the moderating role of human capital in the relationship between urbanization and economic growth in Pakistan using annual data from 1991 to 2024. Employing ARDL and DOLS estimation techniques, the findings reveal that urbanization and education independently exert negative effects on economic growth. However, their interaction significantly enhances growth, indicating that human capital development conditions the growth impact of urbanization. The results suggest that Pakistan’s urbanization process has been largely consumption-driven rather than productivity-driven (Gennaioli et al., 2013; Mehboob et al., 2025). Without adequate investment in education, skills, and urban infrastructure, expanding urban populations place pressure on limited resources, leading to unemployment and low output growth. However, when urbanization is complemented by improvements in human capital, it becomes a catalyst for economic growth.

Based on the empirical findings, the study underscores the importance of placing sustainable urbanization at the center of development policies in line with the objectives of Sustainable Development Goal 11. Policymakers should give greater attention to designing and implementing urban development strategies that effectively leverage the benefits of agglomeration economies arising from rapid urban growth. In the context of Pakistan, this requires a deliberate focus on urban policies that transform growing cities into engines of productivity, innovation, and inclusive economic activity. A major constraint identified is the persistent deterioration of infrastructure, which continues to impede industrial expansion and exacerbate unemployment. To address this challenge, urban and economic planners should prioritize large-scale investments in critical infrastructure, particularly in energy supply and integrated transport systems such as roads and railways. Improved infrastructure can enhance industrial productivity, reduce transaction costs, and support balanced urban development, thereby contributing to the creation of well-managed and economically vibrant cities. Furthermore, the findings reveal that human capital plays a complementary role in strengthening the relationship between urbanization and economic growth. As such, strategic policy initiatives aimed at improving human capital, especially through enhanced investment in education and health, should be accorded high priority. Within the education

sector, there is a need to reform and modernize learning systems by aligning curricula and training programs with the skills required for sustained economic growth (Gennaioli et al., 2013; Islam et al., 2022). Emphasis should be placed on skills development and vocational training that enable the workforce to fully exploit the productivity gains associated with urban agglomeration.

Despite its contributions to the literature on urbanization and economic growth, this study is not without limitations. First, the analysis concentrates primarily on the education component of human capital and is confined to a single-country context. Future research could extend this work by incorporating the health dimension of human capital to provide a more comprehensive assessment. In addition, further studies may examine the mediating or moderating roles of other macroeconomic factors that influence the urbanization–growth relationship. Comparative analyses across countries or the use of panel data covering multiple economies would also offer broader insights and enhance the generalizability of findings. While addressing these gaps would deepen understanding of the subject, they do not diminish the significance or policy relevance of the present study.

References

- Ahmad, T. (2022). Investigating the Relationship between Inflation and Economic Growth: A Case of Pakistan. *Acta Pedagogica Asiatica*, 1(1). <https://doi.org/10.53623/apga.viii.64>
- Batool, M., Shaikh, N. N., & Dilshad, W. Bin. (2023). IMPACT OF BUDGET DEFICIT, MONEY SUPPLY AND GDP GROWTH ON INFLATION IN PAKISTAN: AN ECONOMETRIC ANALYSIS. *Tribhuvan University Journal*, 5(3).
- Beihai, U., & Akhtar, M. (2023). MACROECONOMIC FACTORS AND POVERTY IN PAKISTAN: EXPLORING THEIR IMPACT ON RURAL-URBAN MIGRATION. *Global Journal of Humanities and Social Sciences*, 02(01). <https://doi.org/10.55640/gjhss-social-312>
- Bozbura, F. T., Beskese, A., & Kahraman, C. (2007). Prioritization of human capital measurement indicators using fuzzy AHP. *Expert Systems with Applications*, 32(4). <https://doi.org/10.1016/j.eswa.2006.02.006>
- Cervantes Puma, G. C., Salles, A., & Bragança, L. (2024). Nexus between Urban Circular Economies and Sustainable Development Goals: A Systematic Literature Review. In *Sustainability (Switzerland)* (Vol. 16, Issue 6). Multidisciplinary Digital Publishing Institute (MDPI). <https://doi.org/10.3390/su16062500>
- Channa, R. B., & Lohmeier, S. (2025). Governance of coal resources in the Sindh province (SE-Pakistan): an evaluation of challenges and reforms. *Discover Sustainability*, 6(1). <https://doi.org/10.1007/s43621-025-02142-4>
- Chen, M., Chen, L., Cheng, J., & Yu, J. (2022). Identifying interlinkages between urbanization and Sustainable Development Goals. *Geography and Sustainability*, 3(4), 339–346. <https://doi.org/10.1016/j.geosus.2022.10.001>
- Gennaioli, N., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2013). Human capital and regional development. *Quarterly Journal of Economics*, 128(1). <https://doi.org/10.1093/qje/qjs050>
- Gomes, O. (2024). Economic Growth in the Age of Ubiquitous Threats: How Global Risks are Reshaping Growth Theory. *Economics*, 18(1). <https://doi.org/10.1515/econ-2022-0059>
- Guan, L., Li, S., & Gu, M. M. (2024). AI in informal digital English learning: A meta-analysis of its effectiveness on proficiency, motivation, and self-regulation. *Computers and Education: Artificial Intelligence*, 7. <https://doi.org/10.1016/j.caeai.2024.100323>

- Hatab, A. A., Cavinato, M. E. R., & Lagerkvist, C. J. (2019). Urbanization, livestock systems and food security in developing countries: A systematic review of the literature. *Food Security*, 11(2), 279–299. <https://doi.org/10.1007/s12571-019-00906-1>
- Hu, J., Hu, L., Hu, M., & Dnes, A. (2023). Entrepreneurial human capital, equity concentration and firm performance: Evidence from companies listed on China's Growth Enterprise Market. *Managerial and Decision Economics*, 44(1). <https://doi.org/10.1002/mde.3673>
- Islam, M., Zhang, B., & Managi, S. (2022). The trade-off between natural capital and human capital in Pakistan. *Sustainability Science*, 17(5). <https://doi.org/10.1007/s11625-022-01143-w>
- Khan, O., & Younas, M. Z. (2019). Interaction between Energy Consumption and Economic Growth in Pakistan: A More Comprehensive Analysis Using ARDL Approach. *Energy Economics Letters*, 6(1). <https://doi.org/10.18488/journal.82.2019.61.30.51>
- Liu, Y., Yang, M., & Cui, J. (2024). Urbanization, economic agglomeration and economic growth. *Heliyon*, 10(1). <https://doi.org/10.1016/j.heliyon.2023.e23772>
- Luqman, M., & Antonakakis, N. (2021). Guns better than butter in Pakistan? The dilemma of military expenditure, human development, and economic growth. *Technological Forecasting and Social Change*, 173. <https://doi.org/10.1016/j.techfore.2021.121143>
- Mehboob, A., Rafique Shaikh, Dr. M., Memon, Dr. S., Naeem, M., & Larik, A. (2025). Computational Intelligence for Sustainable Urban Planning and Smart Cities. *International Journal of Advanced Multidisciplinary Research and Studies*, 5(2). <https://doi.org/10.62225/2583049x.2025.5.2.4088>
- Mill, J. S. (2019). Chapters on Socialism. *Sustainability (Switzerland)*, 11(1).
- Montenegro Neyra, C. A. (2019). Las Infecciones del Tracto Urinario Durante el Embarazo y su Relación con el Parto Pretérmino. *Universidad Cesar Vallejo*, 26(3).
- Ngcamu, B. S. (2022). The effects of urbanisation on food security in Africa: An overview and synthesis of the literature. In *Environmental and Socio-Economic Studies* (Vol. 10, Issue 2, pp. 40–48). De Gruyter Open Ltd. <https://doi.org/10.2478/enviro-2022-0010>
- Omodero, C. O. (2019). Fiscal Devolution and Human Capital Formation in Nigeria: Emphasis on Independent Generated Funds of the Three Tiers of Government. *International Business Research*, 12(4). <https://doi.org/10.5539/ibr.v12n4p21>
- Prasetyo, P. E., & Kistanti, N. R. (2020). Human capital, institutional economics and entrepreneurship as a driver for quality & sustainable economic growth. *Entrepreneurship and Sustainability Issues*, 7(4). [https://doi.org/10.9770/jesi.2020.7.4\(1\)](https://doi.org/10.9770/jesi.2020.7.4(1))
- Rehman, E., & Rehman, S. (2022). Modeling the nexus between carbon emissions, urbanization, population growth, energy consumption, and economic development in Asia: Evidence from grey relational analysis. *Energy Reports*, 8. <https://doi.org/10.1016/j.egyri.2022.03.179>
- Socol, A., Ivan, O. R., Danuletiu, A. E., Cioca, I. C., Botar, C. F., & Virdea, D. E. (2025). The Moderating Role of Governmental Artificial Intelligence in Shaping Green Growth Dynamics in the European Union. *Sustainability (Switzerland)*, 17(22). <https://doi.org/10.3390/su172210329>
- Turok, I., Scheba, A., & Visagie, J. (2023). Rethinking urbanization and economic development: a synopsis. In *Environment and Urbanization* (Vol. 35, Issue 2, pp. 297–309). SAGE Publications Ltd. <https://doi.org/10.1177/09562478231193829>