

# Exploring the Attributes of Smart City from Organisation's Perspective



## A Study Based on Prayagraj, India

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**Abstract** As, India is resonating its commitment to sustainable development at global fronts, it is essential to consider that the sustainable development of a nation is derived from the well-being of its regions at granular level. However, the dichotomy is that though India is marching toward being a global leader, its cities are finding it difficult to combat with the challenges of migration, urbanization, and disparity. Acknowledging the challenges faced by some of the emerging cities, the Smart Cities Mission was launched in the year 2015 to strengthen the economic, social, and physical infrastructure of 100 cities. However, the achievements of the mission have not been very convincing due to several reasons. One of the major reasons identified is the lack of region-specific study to explore the persisting challenges. Considering the sparsity of such studies, this study is an attempt to explore and highlight the fundamental challenges faced by different types of organizations in Prayagraj (earlier known as Allahabad, one of the 100 cities proposed for smart cities mission). A comprehensive literature review and field survey have been conducted for the study followed by usage of principal component analysis to estimate significance of various attributes of acting as barrier for organizations operating in the city. The findings of the study suggest that factors such as lack of proper power supply, unsupportive government policies and political environment, poor technology adoption rate and unavailability of skilled workforce act as major hurdle. There is a need to focus on removal of major barriers, i.e., energy by using alternate source of energy, ensure supportive investment, and development policy to enhance the attractiveness of the city. The methodology followed could be used to analyze the city and stakeholder specific issues in other proposed smart cities.

**Keywords** Sustainable development · Regional development planning and policy · Regional economic activity · Factor models

**JEL Classification** C38 · R11 · R58 · Q01

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## 1 Introduction

Literature reviewed highlight that development in India has been uneven across states. Industrial states like Delhi, Gujarat, Maharashtra, etc., have tended to leapfrog in while others like Orissa, UP and Bihar have lagged behind [1, 2]. This has been a major cause of growing regional disparity in India with no sign of convergence [3]. Earlier, economists and development organizations used to undermine regional importance to national growth [4] that has resulted into unbalanced growth. Consequently, some regions are over exploited while still ample scope of development could be seen in certain other regions. This regional disparity has been one of the factors leading to reduced national performance [5]. In the recent years, there is a growing concern about regional disparities in India and this has been endorsed by many researchers [6] too. Further, as per Harter. G. et al., equality is one of the three goals to be achieved in order to ensure overall development [7]. Acharya views such disparities as speed-breakers in the way of India's long-term growth prospects. Moreover, Howes et al. argue that though the economic performance at the country level has been improving yet in order to ensure that reforms pick up momentum, each region should take the initiative [8].

Recently, policymakers have also started showing concern toward the issue of regional disparity and special attention is being paid toward cities which have been left behind. Acknowledging this, Smart Cities Mission was also launched in the year 2015 with a view to promote balanced development and sustainable across 100 cities.

Heterogeneity of cities lead to substantial differences in economic performance and there could not be any single ideal path to attain balanced and sustained development in all regions thus different policies are required for different cities depending upon their specific requirements. Thus, in order to promote development at the city level, it is essential to first identify and understand the pain points of the cities from the view point of vivid stakeholders. Though citizens and other stakeholders do communicate their sentiments and dissatisfaction about different aspects of the city at different forums, however, not much empirical researches have been conducted with a view to understand the issues and solve it systematically. Drèze and Sen suggested that "Uttar Pradesh can be seen as a good case to study the development in the lagging regions regarding a number of important aspects of social progress and well-being" [9]. Thus, to fill this literature gap, the study makes an attempt to identify the major issues faced by the organizations in one of the prospective smart city, "Prayagraj." The reason for selecting Prayagraj is that it situated in Uttar Pradesh, a state with (13) highest number of proposed smart cities. Further, it is an apt case of the city strained with the challenges of urbanization.

The study is based on the variables, i.e., major aspects of a city that impacts organizations, identified from the literature reviewed. These aspects are then analyzed empirically to dig out the challenges faced by the organizations. Further to unveil the potential of the region, a comprehensive study of interrelated and supportive aspects has been undertaken and certain suggestions have been made.

## 2 Objectives of the Study

- To identify the challenges faced by organizations in Prayagraj
- To explore the strength and weakness of Prayagraj city by using statistical tool
- To recommend strategy for combatting the challenges faced
- To identify the factors to work upon to promote overall development of the city under Smart Cities Mission.

## 3 Review of Relevant Literature

Harter. G. et al. view smart cities are those that offer a better and more sustainable lifestyle to their constituent in terms of safety, security, transport connectivity, public services, etc. [7]. Different studies focus on different factors of growth like one theory has suggested that urbanization is the crucial factor leading to economic growth of the regions [9]. As per literature reviewed, potential for growth exist in every region across the world [10] and different attributes of a region are viewed as either positive or negative factor the regions own development. In order to draft a strategy for a regions/cities development, it is essential to identify the strengths and weakness of that region/city.

Truly, the role of residents could not be undermined as rightly emphasized that earlier economic growth was tried to be achieved by means of large-scale infrastructure development but today, residents are the motors for development and play superior role in advancement [11]. Further, it is also observed that urbanization has a close nexus with industrialization and overall economic development [12]. However, recently, it has been seen that urbanization has led to challenges such as transport congestion, environmental, health and educational impact of poor living conditions, and increased rate of crime. Further, many cities are not organized in productive ways because of which structural regulatory and institutional constraints hinder productivity and prevent specialization and trade [13].

Demurger et al. view that the variables such as geographical location, proximity to industrial conglomerates, and differential policies of government are crucial to explain difference in economic growth across different regions [14]. Reynolds argues that the administrative and political competences of government are important explanatory variable of development [15].

Furlan et al. emphasize that, success is driven by a combination of various factors such as efficiency, flexibility, innovation, and globalization [16].

Researchers have even mentioned that the successful cities are competitive centers of innovation that has capability to attract young, highly skilled, and talented workers [17]. In order to pace with economies are required to achieve high growth in value-added sectors employing highly qualified human resource and get rid of less profitable sectors, which utilize comparatively less qualified human

resources [18]. But the problem is that we cannot ignore these sectors and their workers. Along with the development of city, it is essential to create room for the poorest people also. Lagging regions are required to reorient their economies in order to safeguard jobs and to diversify [19].

As recommended by Commonwealth Association for Public Administration and Management (CAPAM), the solution for the development are found there where public engagement and new technologies converge [20]. Some researchers have emphasized that SME's partnership have critical impact on economic development [21, 22]. While some view that the proximity to renowned universities enhances the competitiveness of the regions [23]. Some researchers have suggested that concentration of a particular economic activity in a region leads to higher growth rates in that region [24, 25]. It has also been said that the well-connected regions are hubs for wealth generation [26].

It has been found that a diversified economic base also supports the growth and attracts human capital [27]. The study conducted by OECD has also mentioned that there are many benefits of having diversified economies [28].

Literature review has brought out that explanation of economic performance of a region goes beyond narrow measures of economic variables to incorporate political and social forces [29–32]. Based on the literature review, the study incorporates 32 major attributes of the city that may affect an organization and uses multivariate analysis to test how these attributes of the city, Prayagraj affects the organizations operating in the city and how the findings of the study could be used to determine the attractiveness of the city. The attributes considered are listed in Table 1.

**Table 1** Attributes of the city that affect organizations

Sl. no	Attributes of the city that affect organizations	Sl. no.	Attributes of the city that affect organizations
1	Availability of input	17	Parking spaces
2	Input cost	18	Proximity to the market
3	Proximity to supplier	19	Taxes
4	Unskilled labor availability	20	Training facility
5	Unskilled labor cost	21	Airways
6	Water supply	22	Skilled labor availability
7	Environment and climate	23	Land availability
8	Health and hygiene	24	Land cost
9	Image of city	25	Skilled labor cost
10	Natural resources	26	Political environment
11	Intra-city road transport	27	Government support
12	Inter-city road transport	28	Power supply
13	Telecommunication	29	Railways
14	Technology adoption rate	30	Financial institutions
15	Public authorities in the city	31	Bordering cities
16	Research and development	32	Incentives

## **4 Methodology**

Considering the exploratory nature of the study, a comprehensive literature and field survey have been conducted. Primary as well as secondary data have been used. The secondary sources of data being various government publications, research papers, and other available material, whereas the primary data has been collected from the survey conducted using comprehensive questionnaire and informal interviews.

### **4.1 Sampling**

The research applies non-probability purposive sampling toward organizations located in the city of Prayagraj that was conducted for a month. Samples for the study consisted of organizations in different sectors in the city (Indicated as respondent). The purposive sample of 50 industries in region was taken, out of which 41 industries have responded leading to response rate of 82%.

### **4.2 Data Collection**

Questionnaires were handed over to managing person of the respective organization and were requested to fill them on the spot. It has been ensured that questionnaires are filled by representatives from the organizations having sound knowledge about, its performance and the range of factors affecting them. Moreover, informal face to face interviews have been also conducted in order to get a deeper insight into the problems faced by them. In addition, filled-in questionnaires were thoroughly analyzed to ensure consistency in data provided by the respondents. The data was collected using a well-structured questionnaire comprising of two parts wherein Part I encompassed profile of industry including industry type, location within the city and their performance while Part II included questions related to different attributes of the city which may have impact on performance of organizations, these required the organizations to rank the impact of attribute on a Likert five-point scale [33] ranging from 1—“no influence”—to 5—“very high influence.” Higher value means the level of influence of the attribute on performance is very high, while lower value signifies that the given attribute has lesser impact on performance. The attributes considered in the questionnaire have been identified on the basis of the various literature reviewed and are listed in Table 1.

## 5 Analysis, Results, and Discussions

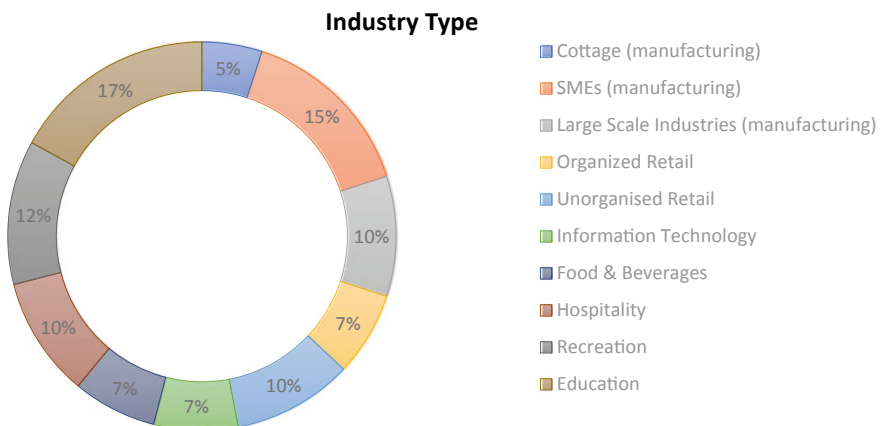
The results of data analysis with respect to these factors are presented in the following sub-sections.

### 5.1 Descriptive Analysis

**Profile of the Sample:** The sample contained 17.1% of education industries, 14.6% of SME’s, 12.2% of recreation industries (tourism) followed by 9.8% of hospitality, unorganized retail and heavy industries. The summary of the sample is shown in Fig. 1.

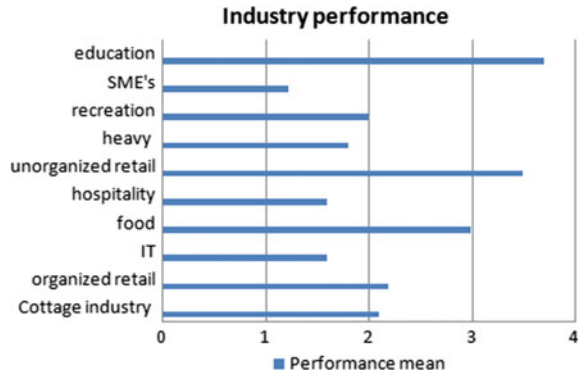
**Average Performance of Industry Sample:** The performance has been measured on a given scale of 1–5 where 5 signifies outstanding performance, whereas 4, 3, 2 and 1 signify above average, average, below average, and poor performance, respectively. The summary of sample performance has been shown in Fig. 2.

Of all the industries considered, organizations from education industry were the best performer with average performance score of 3.7 out of 5, followed by unorganized retail having a score of 3.5, while hospitality, SME, and IT were the worst performers with mean performance score of 1.6, 1.22, and 1.6, respectively. The score of large-scale industry stood at 1.8. Thus, it suggests that the organizations in the above four industries are performing below average and hence require improvement.



**Fig. 1** Profile of sample taken from Prayagraj. *Source* survey conducted

**Fig. 2** Average performance of industry sample. *Source* survey conducted



### 5.2 Inferential Analysis

The data was tabulated and statistically analyzed using the tool SPSS. The analysis has been conducted at two levels, firstly, data was put to “One-Sample Kolmogorov-Smirnov Test” and one-sample t-test, then categorized data was subject to reliability analysis and varimax rotational factor analysis.

**First-Level Analysis:** As per the finding of One-Sample Kolmogorov-Smirnov Test, the variables proved to be normally distributed. Therefore, parametric test was applied. Further, one-sample *t*-test has been applied to identify inconsistencies in the dataset and to compare the mean scores of ratings by different organizations. This has assisted in identifying the relative importance of various city attributes for the sample organizations. The results of “one-sample *t*-test” at  $p < 0.01$  reflecting the relative importance of various factors has been shown in Table 2.

Table 2 reveals that the “Means” of most of the evaluation factors are significantly greater than 3 showing above average influence of factors on industry performance. However, the most important ones in descending order can be cited as: power supply (4.1707) followed by technology adoption (3.9024), skill labor availability (3.8049), government support (3.7073), skilled labor cost (3.5123), and intra-city road transport (3.5122). Further the bottlenecks associated with factors like water supply (2.6341), incentives (2.561), natural resources (2.2927), and airways (2.0732) are the least influential for industries present in the region. Thus, the mean scores indicate that power supply is the major obstacle followed by the technology adoption, skill labor availability, etc., for the respondents in the region under study.

**Second level analysis:** The 32 evaluation attributes have been skimmed down into 8 dimensions using the varimax rotational factor analysis. The main objective of using this is to reduce multiple variables to a lesser number of underlying factors based on correlation among factors [35]. Prior to factor analysis, reliability test for the same was conducted.

**Table 2** Relative influence of factors for 41 industries

Sr. no	Evaluation attributes	Mean <sup>a</sup> (avg score on Likert scale)	Std. deviation	<i>p</i> value	Ranking mean
1	Raw material availability	2.9024	1.56213	0	19
2	Raw material cost	2.7805	1.36953	0	22
3	Proximity to supplier	3.0732	1.4898	0	16
4	Unskilled labor availability	3	1.04881	0	18
5	Unskilled labor cost	2.8293	0.99756	0	20
6	Water supply	2.6341	1.31826	0	24
7	Environment and climate	3.439	1.14124	0	8
8	Health and hygiene	3.3171	1.05922	0	11
9	Image of city	3.4146	1.20365	0	9
10	Natural resources	2.2927	1.36462	0	25
11	Intra-city road transport	3.5122	1.12076	0	6
12	Inter-city road transport	3	1.20416	0	18
13	Technology adoption	3.9024	1.26105	0	2
14	Telecommunication	3.4878	1.16452	0	7
15	Public authorities in the city	3	0.86603	0	18
16	R&D	2.7561	1.44535	0	23
17	Parking	3.122	1.63088	0	15
18	Proximity to the market	3.1951	1.43561	0	14
19	Taxes	3.4878	1.00304	0	7
20	Training facility	3.3659	0.99388	0	10
21	Airways	2.0732	1.3673	0	26
22	Skill labor availability	3.8049	0.74898	0	3
23	Land availability	3.2439	1.13535	0	13
24	Land cost	3.1951	1.03004	0	14
25	Skilled labor cost	3.5123	0.9778	0	5
26	Political environment	3.0732	0.93248	0	16
27	Government support	3.7073	0.84392	0	4
28	Power supply	4.1707	0.80319	0	1
29	Railways	3.2927	1.36462	0	12
30	Financial institutions	3.0488	0.77302	0	17
31	Bordering cities	2.8049	1.26924	0	21
32	Incentives	1.9823	1.3465	0	27

<sup>a</sup>Value on Likert scale [34]: 1 = No influence; 2 = Little influence; 3 = Average influence; 4 = Somewhat high influence; 5 = very high influence

**Reliability test for Factor Analysis:** As the pre-analysis for the suitability of the entire factor analysis, the Kaiser-Meyer-Olkin Measure (KOM) of sampling adequacy and the Bartlett's test of sphericity must be significant at  $p < 0.01$ , thus indicating the suitability of the sample for factor analytic procedure. So, the data were also subjected to reliability test.



**Table 3** KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy	0.808
Bartlett's test of sphericity (approx. chi-square)	1185.530
Df sig.	496.000

As per the reliability analysis conducted in SPSS, the output is shown in Table 3, The KMO value is 0.808, which is greater than 0.5 and chi-square = 1185.530 at  $p < 0.001$ . Since, the value of KMO suggests that degree of common variance is middling and the values of Bartlett's test are indicative that sample inter-correlation matrix did not come from a population in which inter-correlation matrix is an identity matrix the sample is suitable for factor analysis.

**Initial Analysis:** In the initial solution given in Table 4, each variable is standardized to have a mean of 0.0 and a standard deviation of  $\pm 1.0$ . Thus, the variance of each variable = 1.0. A useful factor must, therefore, account for more than 1.0 unit of variance, or have an Eigen value  $\geq 1$ .

As per the analysis conducted shown in Table 4, factors with Eigen values greater than or equal to 1.0 were retained. The first factor has an Eigen value of 6.758. Since this is greater than 1.0, more than a single variable variance is explained by it, Further, the percent a variance explained is 21.120%

**Table 4** Factor analysis—the results of the initial solution

Component		Initial Eigen values			Component		Initial Eigen values		
Sr. no.	Total	% variance	% cumulative	Sr. no.	Total	% variance	% cumulative		
1	6.758	21.120	21.120	17	0.275	0.861	95.618		
2	4.877	15.242	36.362	18	0.252	0.786	96.404		
3	3.746	11.705	48.067	19	0.221	0.690	97.094		
4	3.332	10.412	58.479	20	0.195	0.609	97.703		
5	2.652	8.289	66.767	21	0.155	0.486	98.189		
6	1.841	5.753	72.520	22	0.113	0.355	98.543		
7	1.227	3.836	76.356	23	0.104	0.326	98.869		
8	1.110	3.469	79.826	24	0.098	0.305	99.175		
9	0.911	2.847	82.673	25	0.070	0.220	99.395		
10	0.756	2.364	85.037	26	0.066	0.206	99.601		
11	0.729	2.277	87.314	27	0.039	0.121	99.721		
12	0.685	2.139	89.453	28	0.037	0.114	99.835		
13	0.520	1.624	91.077	29	0.028	0.087	99.922		
14	0.444	1.387	92.464	30	0.015	0.046	99.968		
15	0.378	1.182	93.646	31	0.007	0.023	99.991		
16	0.356	1.111	94.757	32	0.003	0.009	100.000		

*Extraction method* Principal component analysis

*Source* Initial output of factor analysis

$$\% \text{ of variance} = (\text{initial Eigen value} / \text{total Eigen value}) * 100$$

$$(6.758/32) * 100 = 21.120\%$$

Similarly, eight dimensions has been extracted till the Eigen value  $>1$ , that is 1.110. The rest of the 9–32 factors have Eigen values  $<1$ , and, therefore, explain less than a single variable variance. Thus, finally, 8 dimensions were extracted that explained 79.826% per cent of the overall cumulative variance (where, Cumulative variance = Summation of variances having Eigen values greater than 1). The total variation explained by top three components is 21.120%, 15.242%, and 11.705%, respectively.

**Factor Loading:** The evaluation factors are then classified under 8 dimensions on the basis of their load (correlation) on each dimension, factor loadings greater than or equal to 0.50 have been considered for each dimension; this classification has been done on the basis of varimax rotational analysis executed in SPSS and the output (rotated component matrix) is shown in Table 5.

Table 5 shows that “raw material availability” (0.955), “raw material cost” (0.888), “proximity to supplier” (0.727), “unskilled labor availability” (0.693), “unskilled labor cost,” and “water supply” at (0.572) and (0.505), respectively, are highly loaded on dimension 1, while power supply is highly loaded on dimension 8.

**Ranking of Components based on Average Mean:** On the basis of factor loads, the evaluation factors could be classified into 8 dimensions as given in Table 6.

## 6 Recommendations Based on Findings

Every region has its own weakness and strength so is the case with region dealt in the study. Considering the city analyzed in the study, a multi-dimensional strategic approach is required to promote the balanced development. Consequently, to come out of the vicious cycle of economic decline, the twofold approach toward development is required that involves eliminating the weaknesses to gain strength and focusing upon the strengths to overcome the weakness.

Elimination of the barriers identified from the study could be long-term strategy for developing the city. This will require ensuring proper power supply (by setting up power plants or depending upon alternative sources of energy like wind mill, biogas, solar power, etc.), supportive government policy (by structural and legislative changes in development policies), and pacing up technological advancement (by funding projects, infrastructure development, conducting training, and awareness programs).

In short–medium term, developing the city by focusing on the strength of the city and setting up organizations that remain unaffected or least affected by the

**Table 5** Rotated component matrix

Evaluation factors	Component (factor loads)							
	1	2	3	4	5	6	7	8
Raw material availability	0.955	-0.067	0.013	0.104	-0.071	-0.073	-0.008	0.027
Raw material cost	0.888	0.032	0.005	0.064	-0.081	-0.154	0.015	0.123
Proximity to supplier	0.727	0.298	-0.217	-0.184	-0.191	0.007	0.066	-0.107
Unskilled labor availability	0.693	-0.065	-0.182	-0.019	0.100	0.535	-0.110	-0.025
Unskilled labor cost	0.572	0.239	-0.097	-0.208	0.270	0.528	0.227	-0.124
Water supply	0.505	0.001	0.001	0.485	0.210	-0.176	0.363	0.312
Incentives	-0.467	-0.130	0.463	-0.078	0.292	-0.009	-0.104	0.097
Parking	-0.014	0.858	-0.111	0.158	0.036	0.187	0.200	-0.103
Proximity to the market	0.306	0.847	-0.190	-0.056	0.089	-0.108	0.120	-0.001
R&D	0.044	-0.786	0.395	-0.012	-0.048	0.145	-0.156	0.055
Taxes	0.051	0.635	-0.029	-0.265	0.382	-0.034	-0.232	0.103
Public authorities in city	-0.078	-0.525	-0.148	0.480	-0.194	0.260	-0.403	-0.040
Training facility	0.003	-0.253	0.846	0.064	-0.030	-0.120	-0.038	0.164
Airways	-0.272	-0.185	0.764	0.296	-0.193	0.120	0.163	-0.083
Skilled labor availability	0.197	-0.189	0.710	-0.022	0.213	-0.047	-0.284	0.051
Telecommunication	-0.442	-0.094	0.619	0.188	0.095	0.377	-0.162	0.060
Financial institutions	-0.321	0.054	0.485	-0.318	0.448	0.005	-0.340	-0.092
Environment and climate	0.051	0.043	0.055	0.921	-0.118	-0.073	-0.044	-0.160
Health and hygiene	0.013	-0.170	0.049	0.915	0.149	-0.079	-0.054	-0.046
Image of city	-0.473	0.215	0.336	0.551	0.004	-0.242	0.151	-0.034
Natural resources	0.535	0.131	0.221	0.543	0.116	-0.182	0.345	0.121
Land availability	-0.042	0.267	0.128	0.152	0.809	0.114	0.034	0.132
Land cost	-0.059	0.369	-0.051	0.025	0.752	0.096	0.145	0.358

(continued)

Table 5 (continued)

Evaluation factors	Component (factor loads)							
	1	2	3	4	5	6	7	8
Skilled labor cost	-0.087	-0.149	0.080	-0.015	0.709	-0.390	-0.066	-0.265
Railways	0.433	-0.111	0.133	0.143	-0.493	0.161	0.251	-0.406
Political environment	-0.154	0.014	-0.026	-0.095	-0.038	0.849	0.007	0.015
Government support	0.090	-0.400	0.195	-0.150	-0.126	0.673	-0.086	-0.126
Intra-city road transport	0.074	0.182	-0.201	0.017	0.055	-0.037	0.879	-0.019
Inter-city road transport	0.454	0.057	-0.011	0.087	-0.313	0.241	0.593	-0.283
Technology adaptation	0.109	-0.490	0.333	0.150	0.010	0.163	-0.546	0.243
Bordering cities	-0.215	0.248	0.340	-0.097	-0.338	0.372	0.383	-0.112
Power supply	0.056	-0.106	0.170	-0.145	0.117	-0.049	-0.121	0.853

*Extraction method* Principal component analysis. *Rotation method* Varimax with Kaiser normalization

**Table 6** Factors under 8 dimensions with and their factor loadings

Dimensions (extracted from factor analysis)	Factor loading	Variance explained	Average <sup>a</sup> mean	Ranking
<i>Dimension 1 (basic resources)</i>		15.760%	2.869	8
Raw material availability	0.955			
Raw material cost	0.888			
Proximity to supplier	0.727			
Unskilled labor availability	0.693			
Unskilled labor cost	0.572			
Water supply	0.505			
<i>Dimension 2 (market place attractiveness)</i>		12.232%	3.268	5
Parking	0.858			
Proximity to the market	0.847			
Taxes	0.635			
<i>Dimension 3 (avenues of growth)</i>		10.935%	3.327	3
Training facility	0.846			
Airways	0.764			
Skill labor availability	0.710			
Telecommunication	0.619			
Technology adaption	0.533			
<i>Dimension 4 (inherited city resources)</i>		10.347%	3.116	7
Environment and climate	0.921			
Health and hygiene	0.915			
Image of city	0.551			
Natural resources	0.543			
<i>Dimension 5 (land and human)</i>		9.408%	3.317	4
Land availability	0.809			
Land cost	0.752			
Skilled labor cost	0.709			
<i>Dimension 6 (government policies)</i>		8.245%	3.390	2
Political environment	0.849			
Government support	0.673			
<i>Dimension 7 (Connectivity)</i>		8.073%	3.256	6
Intra-city road transport	0.879			
Inter-city road transport	0.593			
<i>Dimension 8 (power supply)</i>		4.826%	4.171	1
Power supply	0.853			

<sup>a</sup>Average mean of dimension = (( $\sum$  mean of variables under it)/No. of variables under it). This has been ranked in descending order. These 8 dimensions explain total variance of 79.826% are named as “Basic Resources,” “Market Place Attractiveness,” “Avenues of Growth,” “Inherited City Resources,” “Land and Human,” “Government Policies,” “Connectivity,” and “Power Supply.” The average mean of these dimensions has been calculated on the basis of mean calculated in Table 2. This average mean signifies the level of influence of each dimensions, the highest influence is of power supply followed by government policies, while the least influence is of basic resources

**Table 7** Organizations that could be set up under short–medium term development strategy

Industry type	Impact of attributes on organizations in respective industries							
	Power supply	Government and political support	Growth opportunities	Land availability and cost	Market place attractiveness	Connectivity	Basic resources	
Tourism and hospitality	Low	Medium	Low	Medium–high	High	High	Low	
Vocational training	Low	Low	Medium	Low	Low	Low	Low	
Cultural industries	Low	Medium	Low	Low	Low	Low	Low	
Labor-intensive industries	Low	Medium	Medium	High	High	Medium	High	
Warehouses	Low	Low	Low	High	Low	Medium	Low	
Transportation and logistic	Low	Low	Medium	High	Medium	High	Low	

prevailing problems could be the development strategy. Prayagraj could focus on its strengths such as availability of quality skill base, strong road and rail transportation network, good educational institutes, large consumer market, central location, proximity to industrially developed cities, and cultural heritage to attract organizations.

The given Table 7 shows that organizations under certain type of industries could be set up in Prayagraj. This has been recommended on the basis that these are least affected by the prevailing challenges in the city.

Moreover, the collaborative relation between the educational institutes and industries could be an approach for developing knowledge-based economy for the long-term benefit of the region. Further the simultaneous growth of education and IT industries present a lucrative avenue for the city's growth. Vertical and horizontal cooperations would be helpful in absorption and utilization of local talent within the region by providing a clear roadmap for progression of career and region as well. From the history, it could be seen that, Helsinki and other Institutional cities were the major drivers of growth in Finland during the later years of 1990s [36]. Thus, Building up sustainable relations between education and commercial institutions will be benefitting both the parties. This collaboration could be in terms of resource sharing, promoting Research and development initiatives, training and development of employees and students, testing and simulation, outsourcing, branding, and corporate communication.

## 7 Practical Implications

The study uses an innovative casestudy-based approach along with survey method to elicit the critical attributes of the city that hinder organizations operating in a particular city. The findings of the study would help the government, investors, analysts, and scholars in formulating policies and business models keeping in view the persisting opportunities and the hurdles. This would enhance the competitiveness of the city and thereby aid the comprehensive and balanced development starting from the granular level.

## 8 Concluding Remarks

The findings show that the crucial attributes of the city that are viewed as hurdle for different types of organizations are lack of proper power supply, unsupportive government policies and political environment, poor technology adoption rate, and unavailability of skilled workforce. Further, the study also highlights that despite of certain challenges significant growth opportunity resides in various untapped and innovative markets. In order to ensure the development of the city as a truly smart

city, it is essential to think locally while acting globally so that we could “make the best use of” the resources that already exist.

Also, for long-term development, there is a need to attract skilled human resource and investment, upgrade and strengthen infrastructure, and offer conducive business environment. For this, government support and good governance are important pre-requisite. Further, a co-operative and collaborative approach could make it possible to leverage the significant active resources available in the city. The promotion of cooperation and technical assistance among industries and institutions can be effective for retaining highly skilled manpower in the city and ensuring balanced development.

## 9 Limitations of the Study

No research is without limitations; this study is no exception. Due to the paucity of time and resources, the study faces certain limitations. The sample considers 41 organizations for the study. However, in order to generalize the findings of the study, a considerable large number of organizations from vivid industries should be considered. A large number of factors were identified from the literature survey; however, the decision was made to limit the number and content of the questions; this might lead to exclusion of some factors having crucial impact. Further, the data considered in the study are self-reported and so it might be biased.

## References

1. Bhattacharya BB, Sakthivel S (2004) Regional growth and disparity in india: a comparison of pre and post-reform decades. Institute of Economic Growth University of Delhi
2. Central Statistical Organization (2017) Statement: per capita net state domestic product at constant (1999–2000) prices
3. De P (2008) Fourth international Russia-India-China annual conference, RIS, New Delhi, 20–21 Nov 2008
4. OECD (2009) Regions matter: economic recovery, innovation and sustainable growth, 12 Dec 2009. ISBN: 9789264076518
5. Wu Y (2006) Regional growth, disparity and convergence in China and India: a comparative study, the ACESA
6. Acharya SN (2002). India’s medium-term growth prospects. Economic and Political Weekly, 13 July 2002
7. Harter G, Sinha J, Sharma A, Dave S (2008) The role of ICT in City development, sustainable urbanization. Booz & Company, [www.booz.com/media/uploads/Sustainable\\_Urbanization.pdf](http://www.booz.com/media/uploads/Sustainable_Urbanization.pdf)
8. Howes S, Lahiri AK, Stern N (2003) State-level reforms in India: towards more effective government. Macmillan India Limited, New Delhi
9. Dreze J, Sen A (1996) India: economic development and social opportunity. Oxford University Press



10. Ahluwalia MS (2002) State level performance under economic reforms in India. Economic Policy Reforms and the Indian Economy. University of Chicago Press, Chicago
11. OECD (2009) How regions grow: trends and analysis, 24 June 2009. ISBN: 9789264039452
12. Lucas J (1988) The mechanics of economic development. J Monet Econ. North Holland, Feb 1988
13. Lall SV, Henderson JV, Venables AJ (2017) Africa's cities: opening doors to the world. Washington
14. Dé Murger S, Sachs JD, Woo WT, Bao S, Chang G (2002) Geography, economic policy, and regional development in China. Asian economic papers. MIT Press
15. Reynolds L (1983) The spread of economic growth to the third world: 1850–1980. J Econ Lit
16. Furlan A, Grandinetti R (2007) Business networks and the internationalization of local cluster suppliers. University of Padova, accessed at <https://www.impgroup.org/uploads/papers/6711.pdf>
17. Kurt G, Gornig M, Werwatz A (2005) Economic growth of agglomerations and geographic concentration of industries, Evidence for Germany, Berlin
18. Simmie J (2003) Innovation and urban regions and national and international nodes for the transfer and sharing of knowledge, regional studies
19. CAPAM (2010) CAPM 2010 international innovations awards
20. Sherer S (2003) Critical success factors for manufacturing networks as perceived by network coordinators. J Small Bus Manage, SMEs, Prentice Hall, London
21. Brunetto Y, Wharton R (2007) Moderating role of trust in SME owner/managers' decision-making about collaboration, J Small Bus Manage
22. Firoz ABM (2004) Urban growth dynamics of Khulna City: a case study on ward no. 09, 20 &24, URP Khulna, Khulna University
23. Sachs JD (2004) Stages of economic development (transcript). The Chinese Academy of Arts and Sciences, Beijing
24. Henderson VJ (2004) Brown university. Urbanization and city growth
25. Hummon NP, Zemotel L, Bullen AGR, De Angelis JP (1986) Importance of transportation to advanced technology companies, transportation research
26. OECD & United Nations OSAA (2011) Economic diversification in Africa: a review of selected countries
27. OECD (2010) Territorial reviews: competitive cities in the global economy. ISBN: 9264027092
28. United Nations (2010) The Millennium development goals report 2010
29. Simmie J (2003) Trading places: competitive cities in the global economy. European Planning Studies
30. Winden WV, Woets P (2004) European cities in the knowledge economy—the cases of Amsterdam. Dortmund, Eindhoven
31. Yin RK (1994) Case study research: design and methods. Sage, Thousand Oaks, CA
32. Barro RJ (1991) Economic growth in a cross section of countries. Quart J Econom, May 1991
33. Sala-i-Martin RJ, Barro R (1995) Technological diffusion, convergence, and growth, economics. Working papers 116, Department of Economics and Business, Universitat Pompeu Fabra
34. Likert RA (1932) A technique for the measurement of attitudes. Arch Psychol
35. Charles MF (2009) Notes on factor analysis, Criminal Justice Center, Sam Houston State University
36. OECD (2002) Territorial review on Helsinki