



A Strategic Approach To Correction Factor Determination Through Ipa Analysis

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	Abstract The presence of recreational open spaces in urban areas is of paramount importance when it comes to promoting physical activity and improving one's overall health and wellness. To perform these activities, the public tends to visit public urban parks. These public urban parks are a combination of six different attributes: amenities/facilities, connectivity, physical features, visual attributes, surveillance, and management. These attributes are qualitative, but to understand these attributes, quantitative measures should be done. Therefore, this study focused on quantitative attributes analysis using the Likert scale as a tool. This study assessed the importance and performance of each park based on twenty-four different factors using the Importance-performance analysis (IPA) method. A study was conducted on six selected parks in Korba city to determine the importance of each factor that attracts visitors. The study also aimed to identify gaps in these factors that need improvement to enhance the quality of the park. The findings of this study provide a methodology for local officials with guidance on how to design and manage public parks that encourage the public to visit the parks. Furthermore, it creates a standard for other cities with similar population densities to measure their park qualities and take necessary measures. This approach can be used in recreational space to evaluate the current situation. Keywords: Public urban parks, correction factors, Importance Performance (IPA), Recreational space, Visitors
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1. Introduction

Public Urban parks play a crucial role in a city's recreational spaces, providing a space for the public to engage in recreational activities, serving as the "green lung" of the city, and also enhancing its surroundings (Privora et al., 2015). These parks also serve essential social functions, acting as spaces for public interaction.

Urban development and redevelopment plan with suitable encouragement, must assign enough urban green areas with appropriate locations and design for human and natural biomes (Jim, 2004). Also, urban land-use

planning procedures should include a systemic evaluation of the public green spaces to reach sustainable urban growth (Kong et al., 2007).

Despite having low direct economic value, urban parks generate significant indirect economic value, as they are considered a public utility. The government typically guides the construction of these parks, assigning the design and planning task to a specific institution (Annerstedt et al., 2012; Konijnendijk et al., 2013). Design schemes are reviewed by experts and the public before construction, but it remains unclear whether the quality of the park meets the public's demands to support optimal visitation.

When it comes to designing a park, it is crucial to take into account the needs of the public as well as specific interest groups (Goličnik & Ward Thompson, 2010). Operating and maintaining a park can pose challenges requiring constant attention and improvements (Duygu, 2016; Ly & Nguyen, 2017). Assessing quality is crucial in many sectors, including numerous types of services like design, customer satisfaction, and the tourism sector. Their efficiency has been repeatedly proven. These assessments provide valuable insights and feedback on the performance and overall quality of a service, ensuring that the needs and expectations of users are met. Organisations that aspire to maintain exceptional user experiences and uphold elevated standards must recognise the critical importance of quality assessments (Orion et al., 2019; Qazi, 2013; Vliet et al., 2021). As a well-established system for evaluating quality, such assessments can provide an unbiased evaluation of a park's service quality, which can guide future design, upgrades and renovations.

The IPA (Importance-Performance Analysis) tool is highly effective in evaluating service quality in the leisure and recreational industry, specifically in tourist satisfaction, tourism management, and cultural perception. This tool enables one to represent the perceived importance of each service factor and the corresponding level of public satisfaction on a two-dimensional coordinate system, as seen in Figure 1. This data is essential in creating targeted strategies for improvement. When it is challenging to quantify the public's attitude towards a particular aspect of park service, the IPA technique can convert qualitative questionnaire data into quantitative data using scoring scales such as the Likert scale. By utilising the IPA method, it is feasible to assess the quality of a factor in a park effectively and suggest meaningful improvement measures based on the results. These factors are essential to consider as the correction or corrective factors that must be focused on.

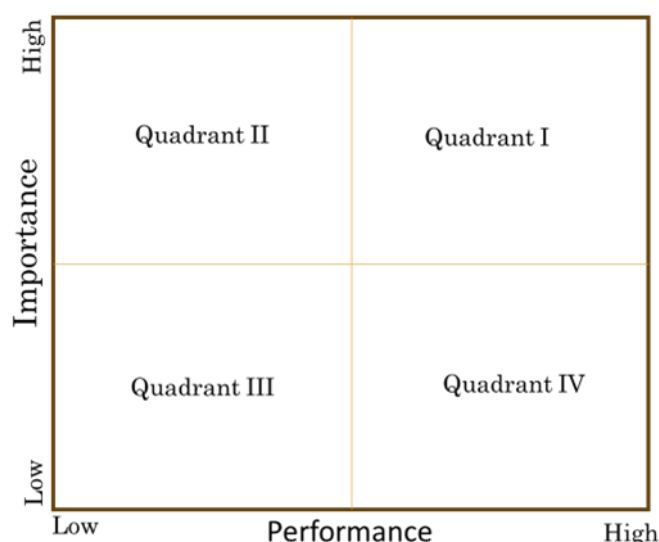


Figure 1 Importance- Analysis Chart

2. Research Methodology

The parks of Korba City are the object of the research. The parks are in different locations of the city. A total of six parks were surveyed during the weekend of the winter season, and questionnaires were filled. The field study was conducted over a period of one month in January 2022, and the time of the research varied for different public urban parks from 5:00 am to 12:00 pm and 2.30 pm to 5:30 pm or as per their opening time for visitors. The study conducted a careful analysis and evaluation of the selected parks, taking into consideration various factors.

S.NO	Park	Area (A) Sq.m
1	Ashoka Vatika (AV)	55362
2	CSEB Park (CSEB)	31269
3	Nehru Park (NP)	57809
4	Silver Jubilee Park (SJP)	72986
5	Smriti Nagar Park (SNP)	16121
6	Vivekanand Udyan (VU)	19401

Table 1 Selected Parks for study.

According to the results of literature retrieval, twenty-four factors with high occurrence frequency in park studies were included. Based on the Qualitative characteristics of the individual, factors are divided into six different attributes based on characteristics. These attributes are amenities/facilities, connectivity, management, physical features, surveillance, and visual attributes (Kermani et al., 2022; Khanna et al., 2017) (Mansouri Daneshvar et al., 2017) (Table 2). After interviews and surveys with the design personnel, review experts and the general public each factor is scored on a five-point Likert scale. For the questions about the importance of each factor, five options were provided: "absolutely important", "very important", "of average important", "of little important", and "Not important at all". For each option, 5, 4, 3, 2, and 1 scores were assigned, respectively. Whereas for the questions about the performance of the factor, five options were provided: "Excellent", "Above Average", "Average", "Below Average", and "Very Poor". These five options were scored as 5, 4, 3, 2, and 1, respectively (Dinda & Ghosh, 2021).

The mean values, standard deviations and mean deviations of the scores for the importance-related and performance-related questions were calculated. A detailed depiction of the IPA application program first consists of a survey of factors and scales; a survey of the scores of the importance (I) and performance (P) of each factor is established. Subsequently, the IP graph is constructed based on the findings. Based on the scores measuring the importance and performance of each factor, the factors are categorised into one of four quadrants (Boley et al., 2017). A thorough explanation regarding the allocation of the factors to their appropriate quadrants has been furnished.

Quadrant I is the high-P and high-I region, which is considered to be of high importance and high performance. To address the issue, it's essential to continue making efforts. Quadrant II is the low-P and high-I region, considered high importance but low performance. The appropriate solution is to make a significant improvement; quadrant III is low-P and low-I region. The performance of this is deemed to be at a moderate level, while its importance is relatively low. To effectively counteract this issue, it is recommended to assign the lowest priority to the corresponding factor; quadrant IV is the high-P and low-I region, which is considered to have moderate importance and high performance. Maintaining the current state is the best way to counteract potential issues (Addas et al., 2021; An et al., 2013; Boley et al., 2017; Chertow, 2000; Qiao et al., 2014). The factors located in quadrants II, III, and IV hinder the performance of a specific factor that must be addressed. Therefore, these factors are considered as limiting factors.

S.NO	Attributes	Factor No.	Factors
1	Aminities/Facilities	F6	Community centre
		F7	Drinking water facility
		F10	Food vendors
		F13	Parking
		F20	Signage
		F21	Toilet/restrooms
		F23	Waste disposal facility
2	Connectivity	F1	Accessibility
		F8	Entrance
3	Physical features	F11	Lawn area
		F14	Paved pathway
		F15	Playground
		F16	Playground equipment
		F19	Seating/ public furniture
4	Surveillance	F4	CCTV surveillance
		F12	Lighting
		F18	Safety/security
5	Visual Attributes	F3	Aesthetic
		F5	Cleanliness
		F22	Trees
		F24	Waterbody
6	Management	F2	Administrative
		F9	Fees/Charges
		F17	Rules & regulation/policy

Table 2 Attributes and Factors of Park

3. Result & Discussion

In Figure 3, the mean scores of the perceived importance of 24 factors of the park are represented. This indicates a relatively high degree of satisfaction from the public. In terms of the mean scores, accessibility(M=4.7),Administrative (M=36.), aesthetic (M=4.2), CCTV/ surveillance(M=2.5), cleanliness(M=4.0), community centre (M=4.8),drinking water facilities (M=2.3),multiple entrance (M=4.5), fees (M=3.1), food vendors/ eateries (M=2.4), Lawn(M=4.3),lighting(M=4.8),parking facility(M=4.2), paved pathway (M=4.6),Playground (M=4.1),playground equipment (M=3.9),rules and regulation/policy (M=3.6),safety/security (M=4.5), sitting/ public furniture (M=4.8),signage present(M=4.4), toilet/restrooms facility (M=4.2),trees present(M=4.5),waste disposal facilities (M=4.7), recreational waterbody(M=3.2). Table 3 presents data that represents the assessment of satisfaction scores for twenty-four different factors across six parks in Korba city. The analysis demonstrates that, in most cases, the satisfaction scores were lower than the corresponding importance scores. This discrepancy highlights a significant gap that must be addressed to boost visitor satisfaction. To achieve this, it is essential to identify the specific factors that require improvement. An IPA plotted graph can be utilised to quantify these correction factors for each park, providing a clear strategy for enhancing visitor satisfaction. This particular study aimed to measure the correction factors of different attributes and determine which of them require improvement. Through careful analysis, the researchers sought to identify the areas needing further attention and development to achieve the desired outcomes.

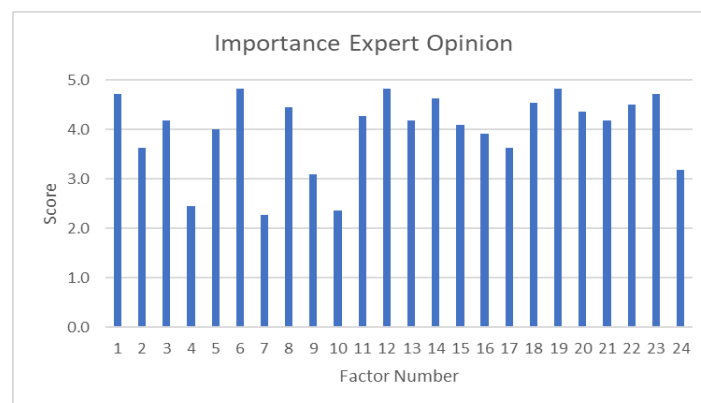


Figure 2 Histogram of Importance of factors

Correction factors, determined using the Equation (Zacarias et al., 2011):

$$Cfx = 1 - Lmx / Tmx$$

Where,

Cf= Correction Factor

Lmx = Limiting magnitude of factor

Tmx = Total magnitude of factor

Where Cfx is the correction factor of attribute x, Lmx is the limiting magnitude of attribute x, and Tmx is the total magnitude of attribute x. The correction factors are obtained by considering all twenty-four factors, which are closely linked to the specific conditions and characteristics of each region or activity.

Table 3 Performance of factors of six parks

S.No.	Factors	Factor No.	Performance					
			SJP	VU	SNP	NP	AV	CSEB
1	Accessibility	FN 1	4.0	4.7	4.7	1.5	2.0	3.7
2	Management Unit	FN 2	3.8	3.6	3.1	2.0	2.1	3.2
3	Aesthetic	FN 3	5.0	4.4	3.4	2.7	1.7	2.8
4	CCTV/ Surveillance	FN 4	4.2	4.1	2.9	1.2	2.5	1.2
5	Cleanliness	FN 5	3.6	3.7	3.1	2.8	2.4	3.5
6	Community Centre	FN 6	1.0	1.0	1.0	1.0	1.0	1.0
7	Drinking Water Facilities	FN 7	4.1	3.9	2.4	1.4	3.3	2.4
8	Multiple Entrance	FN 8	4.3	4.3	4.5	3.6	4.6	4.2
9	Fees	FN 9	3.8	2.1	3.1	4.3	3.9	4.1
10	Food Vendors/ Eateries	FN 10	4.0	2.8	3.1	1.7	1.3	1.7

11	Lawn	FN 11	4.3	3.8	4.3	4.0	1.6	1.4
12	Lighting	FN 12	3.8	3.0	3.8	3.4	1.6	2.4
13	Parking Facility	FN 13	3.8	3.4	4.1	3.6	3.4	3.5
14	Paved Pathway	FN 14	5.0	3.8	4.3	4.4	2.0	2.3
15	Playground	FN 15	1.0	1.0	1.0	1.0	1.0	1.0
16	Playground Equipment	FN 16	4.2	3.9	3.8	1.9	3.0	2.6
17	Rules And Regulation/Policy	FN 17	2.2	3.9	2.8	2.4	2.1	2.5
18	Safety/ Security	FN 18	4.2	4.1	3.2	3.2	3.8	3.0
19	Seating/Public Furniture	FN 19	4.7	3.9	4.7	4.8	2.3	2.6
20	Signage Present	FN 20	2.7	2.5	1.5	1.2	2.0	1.4
21	Toilet/Restrooms Facility	FN 21	4.3	3.6	2.4	1.4	2.8	1.5
22	Trees Present (No. Of Trees)	FN 22	4.8	4.7	4.7	3.8	4.7	4.6
23	Waste Disposal Facilities	FN 23	4.1	3.9	4.1	1.8	2.6	2.3
24	Recreational Waterbody	FN 24	4.3	2.5	2.3	2.0	1.3	1.2

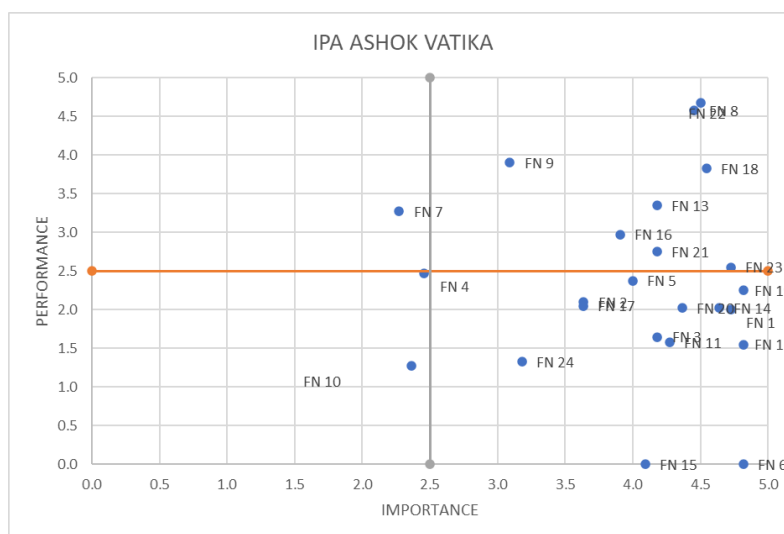


Figure 3 IPA graph of Park 1, Ashok Vatika (AV).

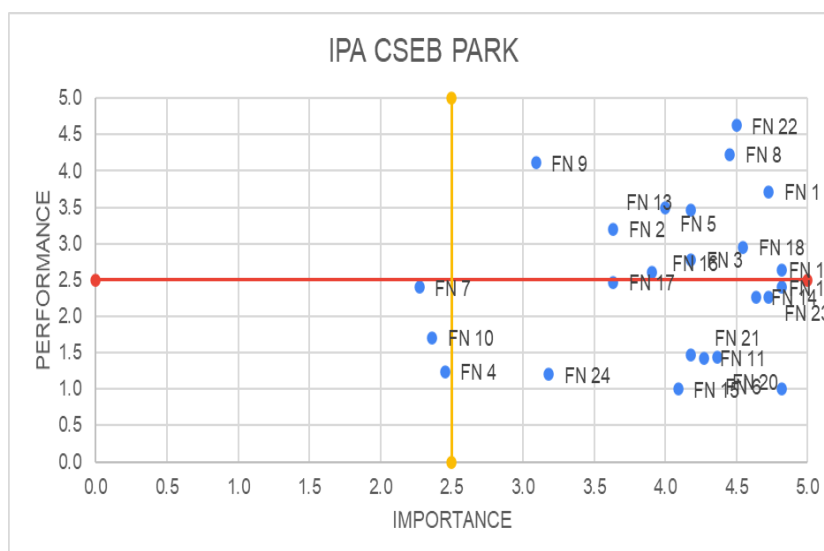


Figure 4 IPA graph of Park 2, CSEB Park (CSEB)

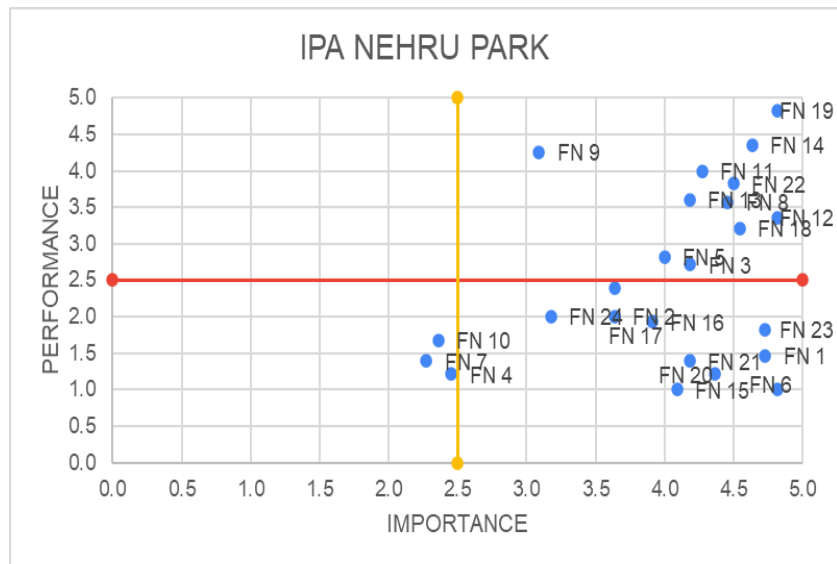


Figure 5 IPA graph of Park 3, Nehru Park (NP)

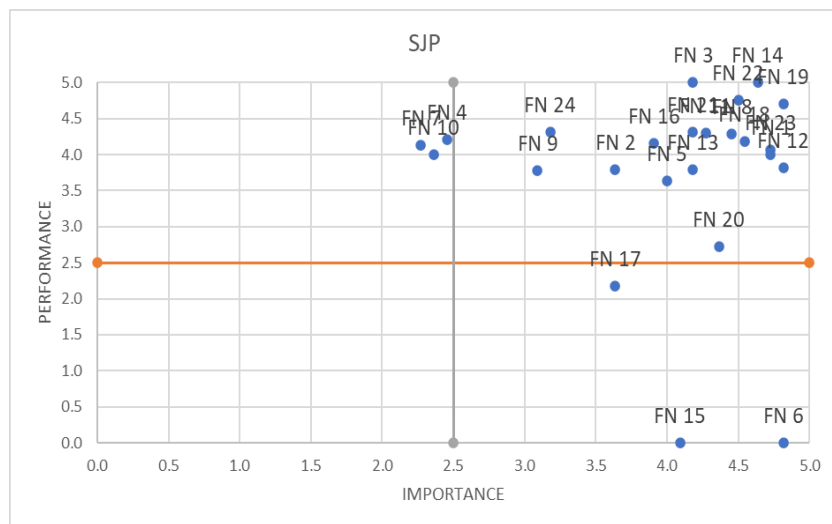


Figure 6 IPA graph of Park 4, Siver Jubilee Park (SJP)

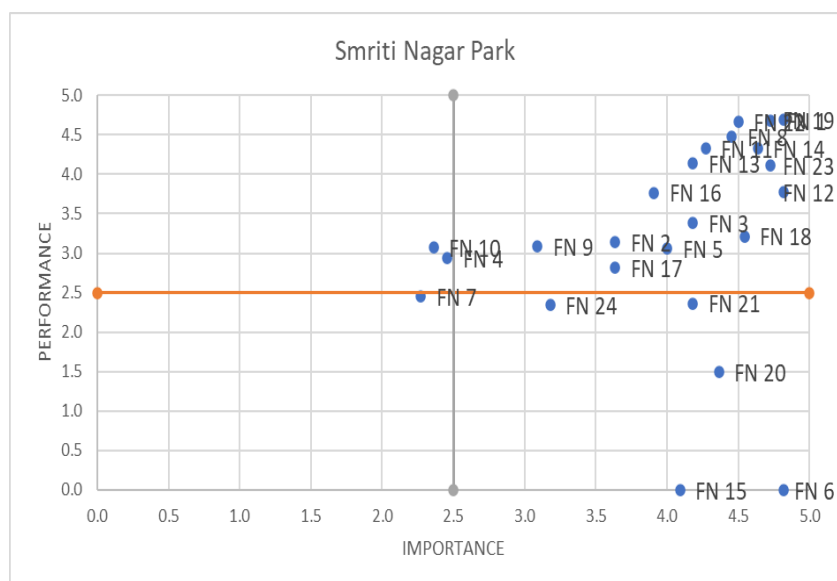


Figure 7 IPA graph of Park 5, Smriti Nagar Park (SNP)

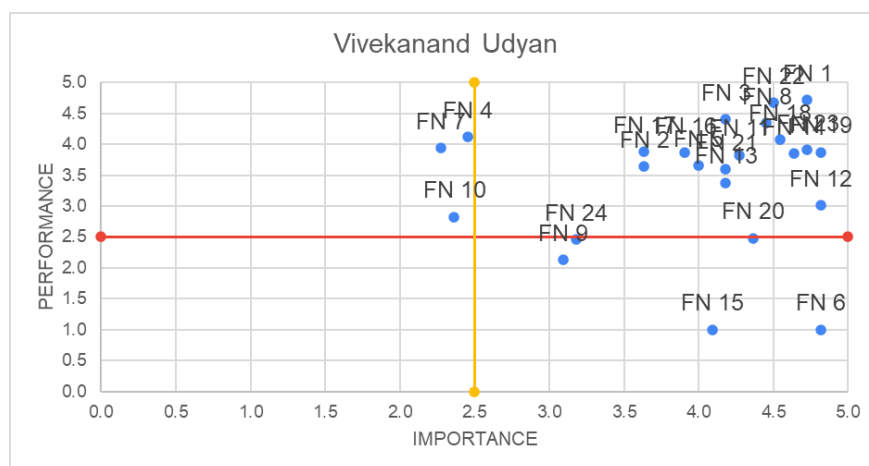


Figure 8 IPA Graph of Park 6, Vivekanand Udayan (VU)

The correction factors (Cf) combine all six attributes, as they can influence and restrict visitors' advent to the site, reflecting a park's qualitative and functional capability. In the present context six correction has been assessed by setting IPA parameters and the result has been given in Table-4.

		S.No.	1	2	3	4	5	6
	Factors No.	Park	AV	CSEB	NP	SJP	SNP	VU
Amenities/facilities	6		-	-	-	-	+	-
	7		-	-	-	-	-	-
	10		-	-	-	-	-	-
	13		+	+	+	+	+	+
	20		-	-	-	+	-	-
	21		+	-	-	+	-	+
	23		+	-	-	+	+	+
		Cf1	0.4	0.3	0.1	0.6	0.4	0.4
Connectivity	1		-	+	-	+	+	+
	8		+	+	+	+	+	+
		Cf2	0.5	1.0	0.5	1.0	1.0	1.0
Physical Feature	11		-	-	+	+	+	+
	14		-	-	+	+	+	+
	15		-	-	-	-	-	-
	16		+	+	-	+	-	+
	19		-	+	+	+	+	+
		Cf3	0.2	0.4	0.6	0.8	0.6	0.8
Surveillance	4		-	-	-	-	-	-
	12		-	-	+	+	+	+
	18		+	+	+	+	+	+
		Cf4	0.3	0.3	0.7	0.7	0.7	0.7
Visual Attribute	3		-	+	+	+	+	+
	5		-	+	+	+	+	+
	22		+	+	+	+	+	+
	24		-	-	-	+	-	-
		Cf5	0.3	0.8	0.8	1.0	0.8	0.8
Management	2		-	+	-	+	+	+
	9		+	+	+	+	+	-
	17		-	-	-	-	+	+
		Cf6	0.3	0.3	0.3	0.7	1.0	0.7

Table 4 Correction Factor Calculation

("-" indicates the factor that is bad in condition and needs to be improved, i.e., limiting magnitude, whereas "+" indicates the factors that are performing well and need to be maintained).

At Ashok Vatika, all six correction factors perform below average, indicating that the park requires more attention. On the other hand, in CSEB Park, Correction Factor 2 (Cf2) and Correction Factor 5 (Cf5) are performing well. In Nehru Park, only Connectivity (Cf5) and Surveillance (Cf4) perform above average. Silver Jubilee Park is in good condition, with all factors above average, but improvement and management are still

necessary. Smriti Nagar Park and Vivekanand Udyan both have poor Correction Factor 1 (Cf1) and require attention from the responsible authority.

4. Conclusion

In Korba City, the quality of the park is evaluated based on 24 different factors. The IPA technique is utilised to display the public's satisfaction level clearly and easily. Any gaps can be identified by comparing the current quality with the public's expectations. The 24 factors are divided into four categories: factors that need ongoing attention, factors that require significant improvement, factors that require moderate development, and factors that need to be maintained. Appropriate measures should be taken based on the category of the factors to enhance the park's quality.

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