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Integration of art in urban design for balanced rejuvenation of public spaces. A case study of Chandigarh

Introduction

As I look around I see the crumbling ruins of a proud civilization strewn like a vast heap of futility. And yet I shall not commit the grievous sin of losing faith in Man. I would rather look forward to the opening of a new chapter in his history after the cataclysm is over and the atmosphere rendered clean with the spirit of service and sacrifice.

Rabindranath Tagore [1]

Technological advancement has caused an increase in the urban population, which in turn is creating pressure on urban spaces [2]. Increasing pressure on urban space and infrastructure with the increasing number of floating populations created dystopic imageries. It causes degradation in terms of social infrastructure and urban spaces [3]–[5]. Thus, dystopic imageries prevail, and imageability decreases. Hence, the public space reeling under the infrastructural pressure needs to design, evolve, re-design, amend and adjust [6], [7].

Increasing urbanization, population influx creates pressure on urban space and infrastructure (on both of its technological/ and normative dimensions). Especially in the case of developing countries like India, the rapidly changing demographic pattern affects the socio-cultural-ethnic background that has further altered the sense of rootedness, ownership, and connection between the place and its stakeholders [8]–[10]. The imageability of public

spaces starts to alter and, therefore, transforms the visual and emotional characteristics associated with them. To cope with the increasing degeneration of the public spaces, intervention needs to be introduced [11], [12]. Interventions can be proposed attempting the shift in the thought process since the inception of these spaces, or design interventions can be introduced to rejuvenate the present conditions of public spaces [13]–[15]. Shifting focus from the physical infrastructure-oriented public space design to the consideration of the emotional context of the space has become the need of the hour [15], [16]. Hence, designing public spaces considering their emotional context (considering its forms and functionality) boosts the sense of place by promoting diverse usability, intimacy, acceptability, and happiness¹ [17]. So, to concentrate on the rejuvenation of public places and squares, the paper forwards the idea of implementing the integrated set of elements of design.

Elements of design can broadly be divided into two sections: i) Technological elements of Design, ii) Art elements of design. Technological elements of design (T-EoD) consider physical infrastructure to secure the necessary amenities and services [18], [19]; whereas, artistic elements of design reflect the aesthetic, socio-cultural, and emotional aspects of human life [20]. The holistic rejuvenation of public spaces necessitates considering the both physical-technological along with aesthetic, functional, and socio-cultural dimensions conceived as a process [21]–[23].

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¹ Urban happiness can be defined as a concept that gives a positive perception of a place to the people who live in it and which induces them to spend a long time there and/or to opt to live there again with the same experience. In his 2013 book *Happy City*, Canadian writer and urbanist Charles Montgomery wrote that “cities have always been a happiness project”. They evolve and adapt based on the needs of the people who live there. As urban designers, we are focused on the human experience and guided by our communities, so we must look to them directly for input.

Hence, this paper attempts to reconsider the rejuvenation of public spaces integrating technological and artistic elements of design in the process. To explore the idea, Chandigarh, a beautiful city (called City Beautiful) has been explored. Three popular public spaces of Chandigarh, India, have been considered for the detailed study.

To fulfill the aim to explore the possibilities of integrated design elements considering urban rejuvenation, the paper forwards the discussion in two parts, i.e.,

– The first section deals with the visual analysis of the elements of design and how it is connected to the rejuvenation of urban spaces by securing happiness.

– The second section explores the detailed study on the three public spaces of Chandigarh and attempts to demonstrate the potential of art elements of design in rejuvenating urban spaces.

SECTION I

Designing public space

The measure of any great civilization is its cities and a measure of a city's greatness is to be found in the quality of its public spaces, its parks, and squares.

John Ruskin [24]

Public spaces in any city are the breathing zones of interaction and activity that demonstrate the quality of life

of the city [16]. Great public spaces are the living room of the city – the place where people come together to enjoy the city and each other. Public spaces enhance the quality of life and form the stage, backdrop and add dynamism to life. Public spaces range from grand central plazas and squares to small, local neighborhood parks [25]. To assure rejuvenation to these public areas, parks, and squares, elements of space design play a vital role. According to Montgomery, the subtle elements of design, modulated by aesthetics and sensitivity, lead a public space to ensure happiness amongst its users [26].

Components of design: Space

Implementing the elements of design to rejuvenate public spaces concerns “space” as an element. Space is a continuous area or expanse which is free, available, or unoccupied [11]. Ideally, public space should be designed as it advocates the functionality of the space along with retaining its indigenous character to enhance the sustainability potential [27]–[29]. Design of space integrating art elements of design attributes the quality to it, as functional space incorporates usability, activity, public participation, and interaction, public spaces need to strengthen social interaction, emotional connection, history, and memories of the users associated with the place [13], [15], [30]. Artistic elements of designs concerning the normative aesthetic components have the potential to activate a space to attain successful rejuvenation [16], [31].



Art driven elements of Design
(backed up by technology)



Technology driven elements
of Design (Supported by Art
and aesthetics)



Fig. 1. Elements of design proposed to ensure urban rejuvenation (elaborated by T. Bhattacharya)

II. 1. Elementy projektowania zaproponowane w procesie odnowy przestrzeni miejskiej (oprac. T. Bhattacharya)

Table 1. Elements of design driven by art and technology (elaborated by T. Bhattacharya, taken from Chandigarh master plan 2031)
 Tabela 1. Rodzaje elementów projektowania urbanistycznego (oprac. T. Bhattacharya, na podstawie planu głównego Chandigarh 2031)

Elements driven by Art	Elements driven by Technology
<ul style="list-style-type: none"> – Art and aesthetical elements and objects – Urban heritage as social, cultural, and normative assets – Architectural elements of design – Intangible elements associated to human emotions and happiness 	<ul style="list-style-type: none"> – Physical infrastructure, constructions, and patterns of structures – Material and resources – Utilities, communication, and services – Transportation and commercial activities

Elements of Design (EoD)

Elements of Design (EoD) concerning public space rejuvenation can be divided into two genres mentioned in Table 1; namely, elements of design predominantly influenced by technology and partially backed by art and elements of design that are predominantly art-driven. The former group deals with the physical infrastructure that considers the fundamental requirements of any public space, whereas the latter aims to incorporate the aesthetic-normative, humane elements to space. Most of the time, while conceptualizing public space, the two genres of elements are posed in contradiction to each other [32]. Especially in the case of public spaces of developing countries with economic crunch only considers the physical infrastructural development, deliberately overlooking the humane elements attached to it; hence, it fails to attain sustainable urban rejuvenation of urban public places and squares [8]–[10], [33]. Therefore, the present paper attempts to establish a dire need of the art elements of design to ensure balanced urban rejuvenation promoting a shift from a paradigm to the paradigm of complementarity.

As evident from Figure 1, complementarity between the art and technological elements of design can transform general public spaces. Table 1 forwards the predominant qualities of both the sets of EoDs. The features mentioned in Table 1 reflect that the T-EoDs concerns more tangible, physical infrastructure, whereas the A-EoDs considers the human being as the centroid of any design conception [34], [35].

Spaces designed through integrated technical and artistic elements of design can become a focus for community pride [36]. Sensitively designed places reflect community values, ideals, and achievements [36], [37].

The conceptual diagram of Figure 2 shows that the artistic element of design recognizes and installs the essential characteristics of a space that nurture the sense of community and promotes ownership. Therefore, the absence of real or perceived barriers (enhanced through design) transforms the shared spaces to be increasingly inviting, attractive, and comfortable. Hence the present paper attempts to rejuvenate public space by integrating artistic elements of design within already available physical infrastructure and facilities [27], [38], [39]. To best understand the need and potential of the EoDs, the following section elaborates on the study focusing on the popular public spaces of the city of Chandigarh.

Methodology followed

To understand the need and impact of the integration of art in urban design for balanced rejuvenation of public spaces, the public spaces of Chandigarh have been studied. To explore and establish the aim of the present paper the following methodology has been followed.

1. Initially, reconnaissance and visual analysis have been done to understand the imageability and quality of space.

2. A questionnaire survey has been done amongst the users of the places based on the artistic and technological elements of design.

The set of EoD is identified majorly from international literature, case studies, and design directives. The set of EoDs applied for analyzing the imageabilities of the public spaces of Chandigarh as a specimen to address the issues of public spaces in Indian urban scenarios. The survey scores have been assessed using the Weighted sum method (WSM) using the following formula,

$$A_i^{WSMscore} = \sum_{j=1}^n W_j A_{ij}, \text{ for } i=1, 2, 3, \dots, m$$



Fig. 2. Integration of elements of art and design (elaborated by T. Bhattacharya)

II. 2. Przykłady połączenia elementów sztuki i designu urbanistycznego (oprac. T. Bhattacharya)

where:

WSM – Weighted Sum Model (a multicriteria analysis),

W_j – denotes the relative weight of importance of the criterion,

A_{ij} – is the performance value of alternative *A_i* when it is evaluated in terms of criterion,

m – alternatives,

n – decision criteria,

W – weight.

The calculated scores forward the idea that integration of art elements triggers the balanced rejuvenation of public spaces and works well in mitigating urban issues of developing countries like India. The scores of Chandigarh show that the design elements can perform far better when applied in integration with art elements, as presented in the design semantics of Corbusier.

SECTION II

Chandigarh:

Elements of art and design in public spaces

This section primarily deals with the background and history of the city that justifies the importance and contribution of the design elements. This study aims to establish the public spaces of Chandigarh as welcoming, attractive, and as a space that connects the stakeholders, imbuing a sense of ownership to the place. Chandigarh has come up as the prototype of the new aspiration of India. The city is the shared capital of Punjab and Haryana and the symbol of new political, figurative, regional, and iconic aspirations of post-independent (post-partition) India.

Background and aspirations

In Chandigarh, Le Corbusier has brought modern city planning, urban space design to India. At the end of the industrial revolution, Chandigarh has exposed concrete, large space design, massive constructions to Indian building construction and design. Chandigarh has come up as a new aspiration of India, the combined capital of Punjab and Haryana. During the partition in 1947, India got divided between the Indus and the Gangetic valley, and the making of Chandigarh was considered as the balancing act between the two. It has come up as the epitome of new political, figurative, iconic (expressions), and regional aspirations.

It was a step to balance the moral degradation amongst folks immediately after the partition of India and Pakistan. So, huge public buildings, designed corridors, elaborated interconnections, creation of spaces between the buildings, connection between the spaces have come up as the new aspiring idiom of urban rejuvenation. Corbusier attempted to connect the space design, building interfaces, and the relationship between the constituents, i.e., buildings and spaces around, to incorporate a sense of joy. The connection and interdependency of the constituents inseminate a sense of joy that affects imageability and ensures rejuvenation. For instance, the open hand monument symbolizes regaining the confidence of

India's western region is psychologically impactful. The newly designed urban space incites a sense of Happiness through well-designed urban space that balances the built, semi-built, and un-built spaces, nature and human needs, vertical and horizontal expansion of the city premise, and most importantly, balanced aesthetics with a technological dimension added to it, as

- Pouring of Concrete to create vistas,
- Integrated urban design and planning,
- The modular co-ordination,
- The measurement principle,
- The gridding of the buildings,
- The rhythm of the huge complexes,
- Datum-Principles of repetition, vistas, and the views.

Along with the effort to infuse the sense of joy in urban spaces, Chandigarh as a city offers a sense of proper urban health and freedom with the possibilities of rejuvenation (with the establishment of Chandigarh University, Law University, and the overall capital complex). This is a journey of urban space from dystopia to utopia. Therefore, Chandigarh, as the living example of the integration of artistic elements of design into infrastructure, has been selected to validate the elements of design aiming at sustainable rejuvenation of public spaces.

As it is evident from Figure 3, Chandigarh is the first planned city in India with a population of 9.01 lakh in 2001. It is also the fastest-growing city with a population growth rate of 40.30%. The construction of the capital city of Punjab has been started back in the early 1950s. The City Chandigarh has been declared a Union Territory in the year 1966 with the joint capital of both the states of Punjab and Haryana. The area of the Union Territory of Chandigarh is 114 sq. km, located at the foot of Shivalik hills.

Population Projection: Chandigarh

The Technical Group set up by the Census of India has made projections for Chandigarh's population for the period 2011–2026. As evident from the population projection of Table 2, Chandigarh had a population of 1 054 686 in the year 2011, which becomes 1 467 834 in the year 2021 and probably will be doubled to around 2 092 952 in the year 2031.

These projections are based on assumed growth rates of 59.67% for the period 2001–2011, and 54.80% for 2011–2021. Hence, the planned city of Corbusier starts to extend on the peripheries while trying hard to maintain the balance between the character of the city and the growing needs of its users.

Basic Land Use pattern: Chandigarh

The city Chandigarh because of its unique concept, is known as “City beautiful” considered as one of the greenest cities of India with its 1400 nos. of green belts/parks/gardens (Table 3).

After the partition of India and Pakistan, the site was chosen because of two reasons, as below

1. The state of Punjab was left without any capital.
2. Partition led to the migration of people of west Punjab to the eastern towns within India.

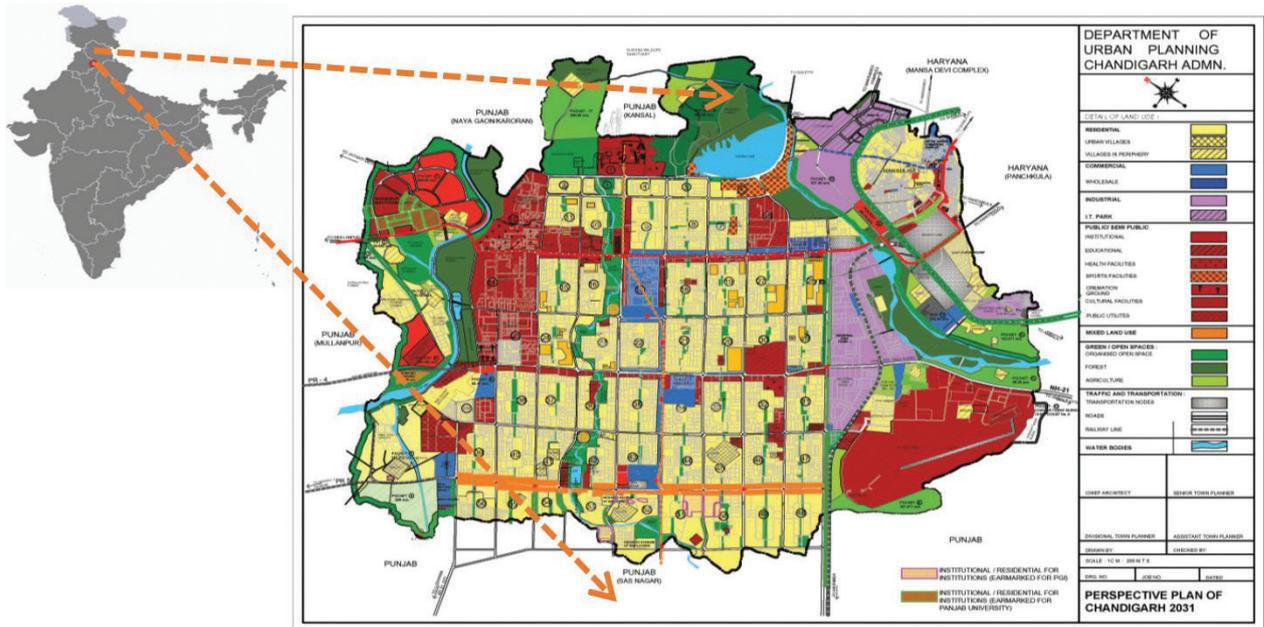


Fig. 3. Locational details of Chandigarh and land-use pattern of Chandigarh (elaborated by T. Bhattacharya, taken from Chandigarh Master Plan 2031)

II. 3. Lokalizacja Chandigarh oraz sposób zagospodarowania terenu Chandigarh (oprac. T. Bhattacharya, na podstawie miejscowego planu zagospodarowania miasta Chandigarh 2031)

Table 2. Projection of population growth of Chandigarh from 2011 to 2031 (elaborated by Census of India)

Tabela 2. Prognoza wzrostu populacji Chandigarh od 2011 do 2031 (oprac. Census of India)

No.	Method	2011	2021	2031
1.	Arithmetic Progression	1 054 686	1 241 647	1 428 608
2.	Geometric Progression	1 054 686	1 474 694	2 061 962
3.	Incremental Increase	1 054 686	1 272 457	1 521 039
4.	Exponential	1 054 686	1 882 540	3 360 200
	Average	1 054 686	1 467 834	2 092 952

Table 3. Land-use pattern of Chandigarh (elaborated by T. Bhattacharya, taken from Chandigarh master plan 2031)

Tabela 3. Sposób zagospodarowania terenu w obszarze Chandigarh (oprac. T. Bhattacharya, na podstawie miejscowego planu zagospodarowania przestrzennego Chandigarh 2031)

Category	Area [%]	Area [km ²]
Residential	64.82	73.90
Commercial		
Industrial	5.04	5.75
Public/semi-public	8.92	10.71
Recreational		
Transportation	1.12	1.28
Agricultural & water bodies	9.96	11.36
Special area*	9.65	Forest 11.00
Total area		114

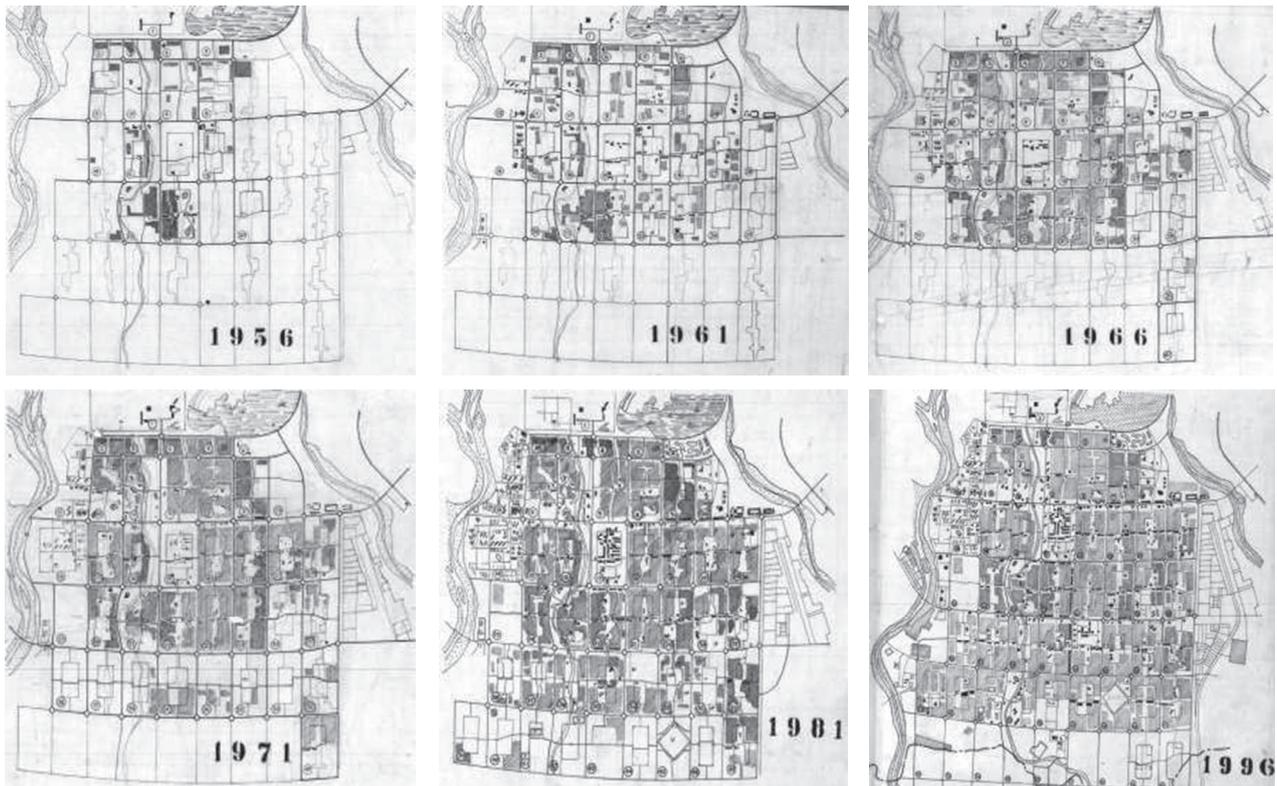


Fig. 4. Evolution of land-use plan of Chandigarh (source: Chandigarh Master Plan 2031)

II. 4. Ewolucja zagospodarowania przestrzennego terenu Chandigarh (źródło: Chandigarh Master Plan 2031)

A committee was set up to choose a suitable site, keeping in mind various factors like:

- military vulnerability,
- drinking water,
- climatic conditions.

Finally, a site has been selected at the foothills of Shivalik. The city got its name from Chandi, the Goddess

of power, and Garh, meaning fortress. Figure 4 shows the gradual development of the land use pattern of the city Chandigarh from 1956 to 1996. It reflects the site from the point of its initiation to settlement, urban growth, and development at the peripheries, planned extensions of the city catering to the escalating need of its users.

Table 4. SWOT analysis of Chandigarh (elaborated by T. Bhattacharya)

Tabela 4. Analiza SWOT dla Chandigarh (oprac. T. Bhattacharya)

STRENGTH	WEAKNESS
<ul style="list-style-type: none"> – Alluvial plains are apt for vegetation – The area is naturally drained by two seasonal rivulets, viz Sukhna Choe in the east and Patiala-Ki-Rao Choe in the west – Since its inception, military vulnerability, drinking water, sewerage, storm water drainage, city roads, solid waste management has been well taken care of – Climatic condition is moderate with a gently sloping land apt for irrigation 	<ul style="list-style-type: none"> – Portions of the periphery witnesses a disordered and haphazard growth due to the spillover of the abadi deh of the peripheral villages – In Chandigarh, more than one-fifth of the population resides in slums, squatters, and other rehabilitated colonies – The increasing pace of migration of slum population
OPPORTUNITY	THREAT
<ul style="list-style-type: none"> – The Master Plan of the fully planned Union territory of Chandigarh covers an area of approximately 114 km² – The city and the periphery have clearly defined boundaries and function plan – Large open areas are available, and well designed public spaces are an integral part of the community and neighborhood life – One of the greenest cities of India with its 1400 nos. green belts/parks/gardens – While designing the city, factors like pollution, traffic, travel and tourism, and other environmental aspects are carefully considered 	<ul style="list-style-type: none"> – Portions of the periphery are fully urbanized – The city and the rest are dotted with pockets of spillover of urban uses, which hampers the overall imageability of the city – During the last six decades (1951–2011), Chandigarh has witnessed a population increase of more than forty-four percent – A clear juxtaposition of the have and have nots can be seen between the planned and the extended portions of the city – The economic disparity between the users is also evident

Table 5. Elements of design and their abbreviations as found in art and technology-based design of Chandigarh (elaborated by T. Bhattacharya)
 Tabela 5. Elementy projektowania urbanistycznego i skróty występujące w projektowaniu opartym na sztuce i technologii w Chandigarh
 (oprac. T. Bhattacharya)

Art driven elements of design	Abbreviations	Technology-driven elements of design	Abbreviations
Availability of adequate green space	GS	Transportation Facility	TF
Availability of adequate open space	OS	Availability of Drinking-Water	DW
Adequate facility to use and promote recreational spaces	RS	Availability of Sanitation Facility	SFM
Visibility of color-scape	CS	Availability of Waste disposal	SWM
Presence and maintenance of water body	WB	Availability of adequate Healthcare facility	HCF
Presence and maintenance of heritage structure	HS	Availability of Education facility	EF
Presence and maintenance of topiary	TO	Visibility of Information center	IC
Visual augmentation by Using/applying murals	MU	Availability of adequate/Proper lighting	SL
Visual augmentation by Using/applying graffiti	GR	Availability of Common Utilities	CU
Visual augmentation by Using/applying paintings	PA	Inclusive design	AAI
Visual augmentation by Using/applying sculptures	SC	Facilities for Pollution check	FPC
Visual augmentation by Using/applying art installations	AI	Availability of IOT facility	C&IOT
Adequate facility to arrange art performances	AP	Accessibility to mass media	MM
Adequate facility to arrange Performing arts	PA	Ensuring safety and security	SS
Facilitating the stakeholders with economic regenerative opportunities	ERH	Consideration of economic activities concerned to the place	EA
Facilitating the stakeholders with community space to promote community interactions	CS		

SWOT analysis of Chandigarh

This section presents the fundamental strength, weaknesses, opportunities, and threats associated with the place (Table 4). Understanding these four aspects aids in understanding the elementary qualities of its public spaces and their constituent design parameters.

Applied design principles: Chandigarh

The applied design principles of urban spaces of Chandigarh can be divided into two parts,

- Art-driven EoD,
- Technology-driven EoD.

Integration of both art and technology-driven (physical infrastructure) elements of design in natural, public, semi-public spaces of Chandigarh has contributed to enhance the imageability of the city higher than the other cities of India [40]. Public spaces of Chandigarh² ideally

² A city with elevated levels of happiness is often one that has invested in the simple pleasures: in creating a sense of community and meaning, and in ensuring freedom to move about flexibly. A happy city, it appears, is a city that designs an infrastructure that supports elementary concepts of human connection. The latest India Happiness Report 2020 is based on a study conducted by Dr Rajesh Pillania, Professor of Strategy at Gurugram's Management Development Institute, and his team in March–July 2020. A total of 16,950 responses were collected from all over India. Chandigarh emerges as one of the happiest in the rankings.

reflect the intangible principles of happiness, namely, Joy, Health, Freedom, Resilience, Equity, and Social Connection based on the integration of the tangible elements of T-EoD & A-EoD [26]. Therefore, Chandigarh claimed to be the first in the list of happiness quotients of Indian cities, whereas the three megacities, i.e., Delhi, Kolkata, and Mumbai, ranked subsequently as 3rd, 10th, and 15th in the list. Thus, the design principles of Chandigarh need to be studied and replicated to create more welcoming, inclusive, happy spaces promoting social interaction and exchange. Table 5 forwards a list of elements of design predominant visible in the public spaces of Chandigarh.

As evident from Table 5, elements related to art and technology that help to trigger the sense of joy in urban spaces are clustered together. As Joy has the principle of nature into design, color scape, Murals, Graffiti as elements of art and maintenance of the space, availability of information kiosks can be considered as elements that trigger Joy. Likewise, Health, both in individual and community level can be maintained by overall green scape, pollution check and hygiene of the city. Freedom as an element of happiness gives the opportunity to express, choice and interconnectedness in terms of technology-driven elements.

The point when an urban space can be defined as joyful, healthy, and free, only then can it be resilient because resilience demands both governmental and public participation. In the case of Chandigarh, sustainable design and technological support add resilience to the city. The next element of design, Equity can be seen through

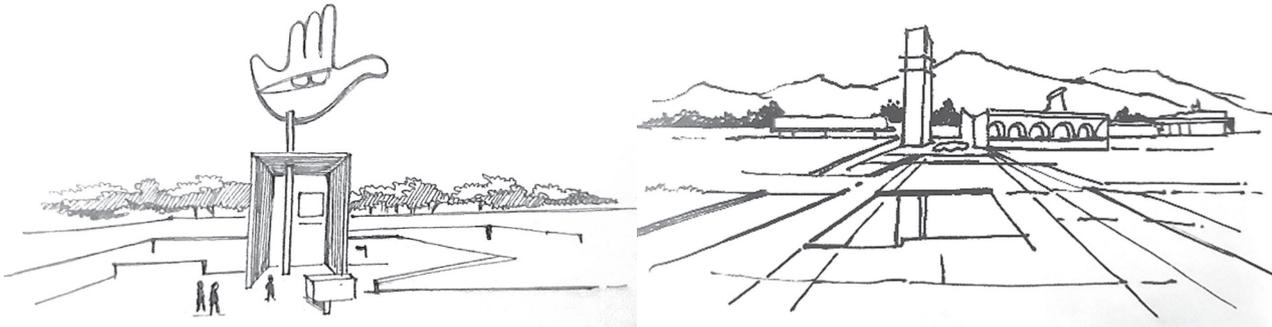


Fig. 5. Views of the Capitol complex of Chandigarh showcasing the open hand monument (left) and large vistas of concrete in front of the Palace of Assembly (right) (drawn by T. Bhattacharya)

Il. 5. Widoki zespołu Kapitolu w Chandigarh z pomnikiem otwartej dłoni (po lewej) i wyłożoną betonowymi płytami przestrzenią widokową przed Pałacem Zgromadzenia (po prawej) (rys. T. Bhattacharya)

homogeneity, common recreational spaces, open performances, and mass communication system. Social connection acted as the culminating point for community and neighborhood building that can be exemplified through architecture, community planning, mass media, etc. Hence, each element of happiness has its positive contribution in making the overall imageability of Chandigarh.

Visual analyses of the public spaces of Chandigarh

Chandigarh has been selected for validation of EoDs as both places offer unique lenses to judge and contextualize the potential of elements of design (EoD). Both the areas have come up as a necessity of the time catering to the needs and aspirations of the users.

In Chandigarh, Le Corbusier has brought modern city planning, urban space design to India [41]. During the partition in 1947, the Indian subcontinent got divided at the Indus valley and the Gangetic valley and that led to the making of Chandigarh which was considered to be one of the balancing acts of many. Chandigarh then came up as a new aspiration of India, as the combined capital of Punjab and Haryana, to epitomize the political, figurative, iconic (expressions), and regional aspirations.

Chandigarh was a step to balance the moral degradation amongst folks immediately after the partition of India and Pakistan. Therefore, Le Corbusier attempted to establish a connection between the space and its people through modern urban design and rejuvenation. Chandigarh then pioneered in presenting large vistas of concrete, the creative interplay of open and semi-open spaces, balanced planning, and zoning considering healthy ratios of nature and built forms against the backdrop of Sukhna lake and the Shivalik Himalayan ranges. Besides huge horizontal vistas in the capitol complex, Corbusier also carefully designed small but meaningful constituents to create functional spaces as building interfaces, spaces around, and the reciprocity between the two. The connection and interdependency of the constituents started to inseminate a sense of happiness of independent India that further enhanced imageability. For instance, the open hand monument (refer to Fig. 5) still visually represents hierarchy and symbolizes regaining the confidence of the Indian mass.

As evident from Figure 6, Corbusier has implemented basic design principles that enhance the visual and functional dimension of his huge concretized public complexes. Two important applications are evident, namely.

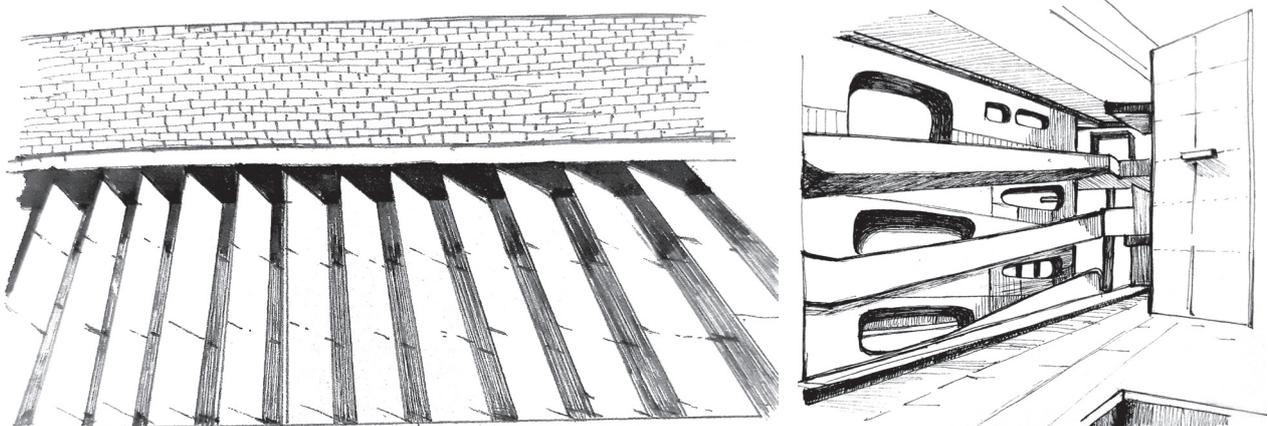


Fig. 6. Glimpses of basic design principles as the use of repetition in Le Corbusier's architectures (drawn by T. Bhattacharya)

Il. 6. Szkice prezentujące podstawowe zasady projektowania – elementy powtórzenia w architekturze Le Corbusiera (rys. T. Bhattacharya)

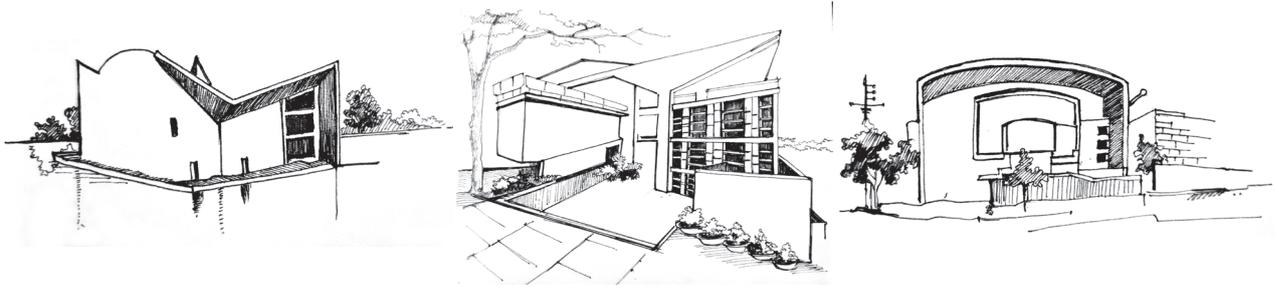


Fig. 7. Buildings as design units exemplifying Le Corbusier's design principles. Gandhi Bhawan (left), Chandigarh Architecture Museum at Le Corbusier's Pavilion (middle), Shopping complex (right) (drawn by T. Bhattacharya)

Il. 7. Budynki jako jednostki projektowe ilustrujące zasady projektowe Le Corbusiera. Gandhi Bhawan (po lewej), Muzeum Architektury Chandigarh w Pawilonie Le Corbusiera (w środku), zespół centrum handlowego (po prawej) (rys. T. Bhattacharya)

The use of horizontal vistas as portrayed in Figure 7 representing the rhythm of the large to small complexes reflects the influence of the "international style" of architecture.

The use of grids in zoning, positioning of the hierarchy of buildings, stressing arrangements highlighting an axis, application of datum principles, repetition of forms, as a whole, create examples of good and liveable urban design.

Corbusier used modular coordination in his built forms based on humane dimensions [42]–[44]. Corbusier experimented with mathematical proportions of the human body to propose Le Modulor [45] as a standard for the human scale in architecture. Chandigarh, therefore, became a living example of his belief that there is no separate natural order and man-made order; instead, man is a part of nature and, therefore, a part of the natural order as well [46]. He also celebrated the humanistic dimensions while designing architectures and their adjacent spaces. Describing Corbusier's buildings as landmarks, Pritzker prize winner Balakrishna Doshi states that: *Not just space and structures, these buildings have profound meanings, tell their own stories and narratives. This is heirloom heritage, one that initiates a dialogue with the soul and makes us look at the value of creation. Our responsibility is to create a murmur, fairytales, and listen to the symphony* [47].

Therefore, the newly designed urban space of Chandigarh excites a good sense of happiness through well-designed urban spaces that balance the built, semi-built, and unbuilt spaces. Two further observations are evident in

Figure 8, Vertical and horizontal expansion of the city in terms of the built form and urban design have emerged, integrating urban design and town planning. Additionally, Chandigarh forwards a variety of elements of design concerning nature and human needs.

Stating the significance of humanistic elements in Corbusier's planning and design, Doshi shares that [...] *as architects, we need to remember we are doing everything for human beings, not machines. Corbusier's philosophy was to live, move, do work, and establish connections between body, mind, and spirit, and the Capitol Complex is a fine example of it* [47], [48].

An initial visual analysis exemplifies that Chandigarh, as a whole, is a result of a balanced approach to urban planning and urban design aiming at a rejuvenated modernization process. The sensible distribution of the elements of design assures good imageability and therefore, enhances happiness. Hence, based on the combination, distribution, and application of the EoDs, Chandigarh has been selected as one case study area. Public spaces of the city have been studied to validate the elements of design (EoD) before its application in understanding the imageabilities of the study areas.

Assessment of EoDs of urban rejuvenation

In this section, assessments of the current imageabilities have been done based on T-EoDs and A-EoDs. A visual assessment has been done initially to observe

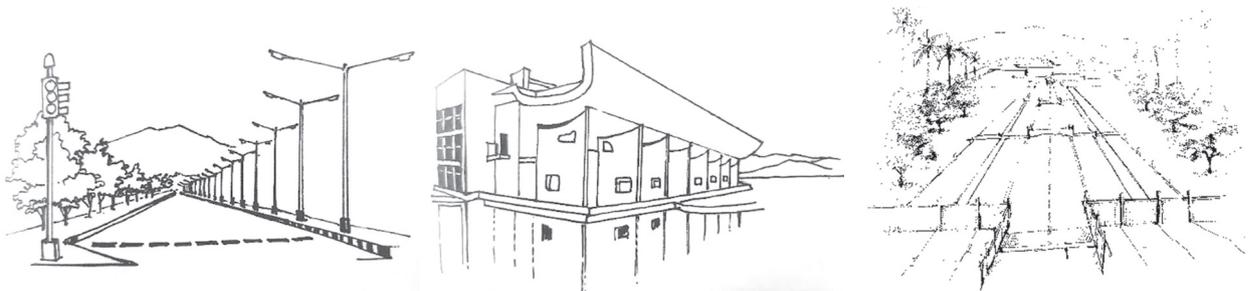


Fig. 8. Integration of urban design and town planning incorporating technological and artistic EoDs (drawn by T. Bhattacharya)

Il. 8. Przykłady połączenia projektowania i planowania miejskiego z technologicznymi i artystycznymi elementami projektowania urbanistycznego (EoD) (rys. T. Bhattacharya)

the design elements that prevailed in the public spaces of Chandigarh, and to find out to what extent they assure rejuvenation of public spaces.

To tap on the current imageability, a questionnaire survey has been conducted among 30 respondents of the age group of 18–65. Opinions have been recorded in three different locations, i.e.,

a) Sukhna Lake area, a predominant source of natural water and ecologically sensitive zone,

b) Istara-Sector 17, an economic, recreational, and transportation hub,

c) The market area of Sector 8, an area designed to be repetitive in all the residential sectors of Chandigarh as Chandigarh has gridiron planning.

The survey aims to record the presence and impact of the elements of design (A-EoD and T-EoD), which can further be modified as per the six recipes of Charles Montgomery, i.e., Joy, Health, Freedom, Resilience, Equality, and Social Connections. The survey has been conducted on a 1–9 point Likert scale; thus, five or the above score can be regarded as significant enough to be considered. Analysis of obtained data provides an opportunity to evaluate the existing locational attractiveness, imageability and identify the potential of artistic elements as means of rejuvenation of public spaces.

Analysis Based on Artistic Elements of Design (A-EoD)

Scores attributed to the art elements of designs resonate with the need for specific elements according to the land-use and functionality. Table 6 summarizes the scores of A-EoDs in all three areas. The following observations can be forwarded based on the artistic elements of design evident in Chandigarh reflected in Figure 9.

Observations

– Welcoming and accommodating horizontal stretch of pavement (with minor alterations/ shift in the pavement/ slope) offers inclusiveness.

– Childrens' park, portable vendor shops, open sitting arrangements at the adjacent area of Sukhna lake enhance the imageability of the space and attract people of all age groups.

– Public art projects add dynamism, increase the attraction and acceptability of the spaces.

– The scores reflect that the availability of green and open spaces are the two vital elements that received the highest scores in all three areas. Though Chandigarh epitomizes wide vistas of concrete, huge buildings, the scores reflect that Chandigarh is one of the best examples of a planned city that created the perfect balance between the built, semi-built, and unbuilt areas.

– The art element of design that emerges as important in securing the imageability of public spaces is the presence and maintenance of water body (8.9) in the Sukhna lake area, availability of recreational space (7) in Istara-sector 17, and facility for community interaction (7) in sector 8 got prominence as it is a residential area.

– The scores presented in Figure 10 reflect the choice of the user according to the physical and artistic need, functionality of the space. For instance, sector 8, being a residential space, stresses more on community space to promote community interactions. Sukhna lake area is an ecologically sensitive zone that cares for green open space along with the water body, and sector 17 gives importance to the recreational spaces. Such hierarchy of one element over others based on the basic functionality and land-use pattern aptly presents a thoughtful distribution of balance between top-down and bottom-up approach, urban design and urban engineering, artistic and technological elements of design.



Fig. 9. Socio-normative elements of design evident in Chandigarh (photo by T. Bhattacharya)

Il. 9. Społeczno-normatywne elementy projektowania widoczne w Chandigarh (fot. T. Bhattacharya)

Table 6. Scores of the three case study areas in Chandigarh based on A-EoD (surveyed and analyzed by T. Bhattacharya)
 Tabela 6. Wyniki z trzech obszarów studiów przypadków w Chandigarh związanych z artystycznymi elementami projektowania urbanistycznego A-EoD (analiza i oprac. T. Bhattacharya)

A-EoD	Obtained scores			Normalized scores		
	Sukhna Lake	Sector 17	Sector 8	Sukhna Lake	Sector 17	Sector 8
Availability of adequate green space	8.5	6.8	7	1.58	0.83	1.71
Availability of adequate open space	8.6	6.9	6.8	1.70	0.94	1.53
Adequate facility to use and promote recreational spaces	6.8	7	5	-0.45	1.05	-0.10
Visibility of color-scape	6.5	6.8	5.1	-0.80	0.83	-0.01
Presence and maintenance of water body	8.9	5.2	5	2.06	-0.97	-0.10
Presence and maintenance of heritage structure	6.8	4.8	3.5	-0.45	-1.42	-1.46
Presence and maintenance of topiary	7.8	6.7	5.2	0.75	0.72	0.08
Visual augmentation by Using/applying murals	6.9	5	5	-0.33	-1.19	-0.10
Visual augmentation by Using/applying graffiti	6.2	4.8	4.8	-1.16	-1.42	-0.28
Visual augmentation by Using/applying paintings	7	6.5	5	-0.21	0.49	-0.10
Visual augmentation by Using/applying sculptures	6.5	6.6	5	-0.80	0.60	-0.10
Visual augmentation by Using/applying art installations	7	6.6	5.3	-0.21	0.60	0.17
Adequate facility to arrange art performances	6.6	6.5	3.5	-0.69	0.49	-1.46
Adequate facility to arrange Performing arts	6.7	5	3.4	-0.57	-1.19	-1.55
Facilitating the stakeholders with economic regenerative opportunities	6.5	5	5.2	-0.80	-1.19	0.08
Facilitating the stakeholders with community space to promote community interactions	7.5	6.8	7	0.39	0.83	1.71
Mean	7.175	6.063	5.113	-	-	-
Standard Deviation	0.839	0.891	1.105	-	-	-

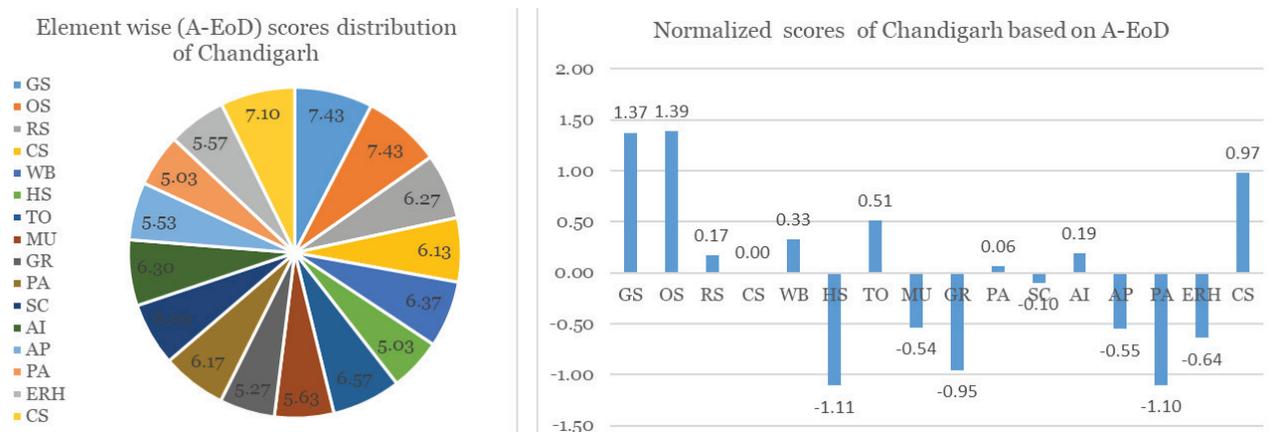


Fig. 10. A-EoD wise distribution of score (left) and normalized data distribution of Chandigarh Based on A-EoD (surveyed and analyzed by T. Bhattacharya)

Il. 10. Diagram prezentujący wyniki związane z artystycznymi elementami projektowania urbanistycznego A-EoD (po lewej) i schemat danych związanych z artystycznymi elementami projektowania urbanistycznego A-EoD dotyczący Chandigarh (analiza i oprac. T. Bhattacharya)



Fig. 11. Integrated technological-artistic elements of designs prevailed in Chandigarh (photo by T. Bhattacharya)

II. 11. Zintegrowane pod względem technologicznym i artystycznym elementy projektowania urbanistycznego dominujące w Chandigarh (fot. T. Bhattacharya)

Analysis Based on Technological Elements of Design (T-EoD)

The rejuvenation potential of the public spaces of Chandigarh has also been mapped based on the T-EoDs, as the technological elements of design assure the basic

requirements of any public space to function properly. It helps to understand the present status of imageability of the case study areas. The assessment helps to understand the extent of the quality of public spaces that technological elements of design can secure. Based on the extent of T-EoDs, Artistic elements need to be integrated to ensure rejuvenation of public spaces and squares.

Table 7. Scores of the three case study areas in Chandigarh based on T-EoD (surveyed and analyzed by T. Bhattacharya)

Tabela 7. Wyniki z trzech obszarów studiów przypadku w Chandigarh związane z technologicznymi elementami projektowania urbanistycznego T-EoD (analiza i oprac. T. Bhattacharya)

No.	T-EoD	Obtained scores			Standardized scores		
		Sukhna Lake	Sector 17	Sector 8	Sukhna Lake	Sector 17	Sector 8
1	Transportation Facility	7.3	8.8	6.8	-0.02	1.65	0.84
2	Drinking Water	6.9	5.5	5.8	-0.62	-1.04	0.06
3	Sanitation Facility	6.5	5.3	5.5	-1.21	-1.20	-0.18
4	Waste disposal	6.8	6.7	5	-0.77	-0.06	-0.57
5	Healthcare facility	7	7.5	6.8	-0.47	0.59	0.84
6	Education facility	7	6.4	6.8	-0.47	-0.30	0.84
7	Information centre	6.5	4.8	3.2	-1.21	-1.60	-1.98
8	Proper lighting	8.5	7	5.2	1.77	0.18	-0.41
9	Common Utilities	8	7.1	6	1.03	0.27	0.21
10	Inclusive design	8.4	7.5	6.3	1.62	0.59	0.45
11	Pollution check	6.8	6.5	5.2	-0.77	-0.22	-0.41
12	IOT facility	6.7	4.8	3.2	-0.92	-1.60	-1.98
13	Accessibility to mass media	7.8	8	6.2	0.73	1.00	0.37
14	Ensuring safety and security	7.7	7.5	7.9	0.58	0.59	1.70
15	Consideration of economic activities concerned to the place	7.8	8.2	6	0.73	1.16	0.21
Mean		7.313	6.773	5.727			
Standard deviation		0.670	1.230	1.276			

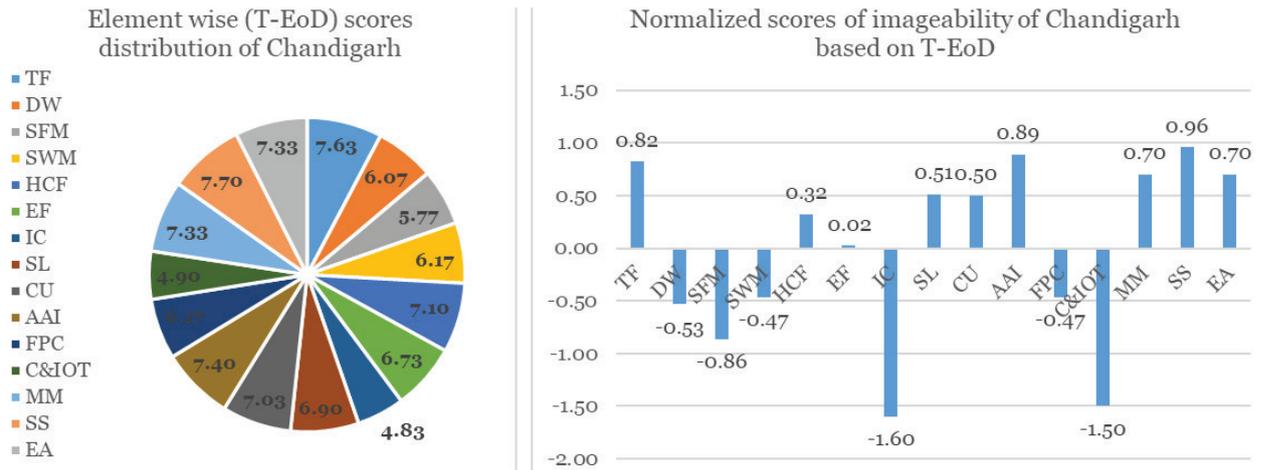


Fig. 12. T-EoD wise distribution of score (left) and normalized data distribution of Chandigarh Based on T-EoD (surveyed and analyzed by T. Bhattacharya)

Il. 12. Diagram prezentujący wyniki związane z technologicznymi elementami projektowania urbanistycznego T-EoD (po lewej) i schemat danych związanych z technologicznymi elementami projektowania urbanistycznego T-EoD dotyczący Chandigarh (analiza i oprac. T. Bhattacharya)

Glimpses of the initial visual assessment are evident in Figure 11. The assessed results of the questionnaire survey are presented in Table 7. The scores reflect the following observations.

- Public spaces are well maintained, aiming at increasing interactions and building a strong sense of community.
- Technology-aided designs, as seen in Figure 11, added a dimension to the vitality of the places, as proper lighting enhances the imageability of the space.
- The presence of technological elements is not overpowering, instead it is presented in complementarity to the artistic elements. The complementarity between the two enhances the effect of both T-EoDs and A-EoDs, assuring good imageability catering to boost happiness.

The successful implementation of T-EoDs and A-EoDs secures the aspirations of the users positively reflected in the scores assigned to each element in Table 7.

Observations

- Table 7 shows the obtained scores of three different places, where the Sukhna lake area is assigned the highest scores, followed by sector 17 and sector 8.
- The scores reflect that the importance is attributed to different elements based on the form, functionality, and land use of individual areas. For example, proper lighting (8.5), standard utilities (8), and inclusive design (8.4) score highest in the Sukhna Lake area as it is an ecologically sensitive public space meant for recreation.
- In the case of transportation and recreational hub Is-tara-Sector 17, transport (8.8), healthcare (7.5), consideration of economic regenerative possibility (8.2) become more important and the highest scorer. The same inclination toward form and functionality also gets reflected in the scores of sector 8, as the demand for safety-security (7.9), transport (6.8), healthcare (6.8), and education facility (6.8) received the highest importance.

– As forwarded in Figure 12, the scores reflect the perfect balance of the need and aspirations of the stakeholders and the facilities provided as per location, form, and functionality of the areas (resultant of good planning and policies maintained).

- Except for the presence of IoT facility and Information center in sector 17 and sector 8, none of the elements of design scored less than five that reflects the satisfaction of the users with the present condition of the spaces and testimony of good imageability.

Conclusion

Analyzing the data set surveyed reveals that art and design elements contributed significantly in ensuring the rejuvenation potential to public spaces, parks, and squares of Chandigarh and further seem to be equally impactful in other public spaces of India. Considering the results, the paper forwards the idea of promoting the art elements of design to augment the imageability, sensitivity of public spaces beyond the reach of the physical infrastructure. Technological elements have the potential to make the place equipped with utilities, services, and maintenance, whereas artistic elements of design cater to establish the connection between the place and its people. Art elements nurture the sense of place by considering the aesthetic, cultural, historical, emotional anecdotes as the humane elements.

Hence, the assessment done considering the public spaces of Chandigarh reveals that A-EoD and T-EoD in complementarity to each other act as a whole. Implementing both of the design elements suffice the basic (Physical) and the aesthetic (psychological) need of the places meant for public interactions and activities. The integrated artistic and technological elements of design aid to restore the sense of happiness, promote physical and psychological health, ensure freedom by generating the sense of assimilation, enabling to make the space more inclusive. The art elements of design activate the public spaces to be more inviting, acceptable to people beyond the discrimination of gender, caste, age, status, and assure social connection and cohesiveness amongst the users. So, to conclude, it can be said that Chandigarh, as a case study, proves that integrated implementation of the design elements aids to ensure balanced urban rejuvenation and hence, happiness.

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Abstract

Integration of art in urban design for balanced rejuvenation of public spaces. A case study of Chandigarh

"Urban space" exemplifies the synergy of space in an urban location and its structural or compositional elements from the social and institutional forces. Contemporary public spaces tend to perform commemorative functions related to different activities for the users, starting from physical, social, to psychological and aesthetic concerns. These public spaces add dynamism to social life; hence, public spaces need to be built in a way that promotes healthy interaction and community well-being.

However, in contemporary urban scenarios, the expeditiously booming population is deliberately encroaching the open spaces in and around the city, making it more claustrophobic, cramped, and oppressive which further affects the physical and mental health of the stakeholders. As a result, imageability and happiness associated with public and semi-public urban spaces are choking. Therefore, to cope with the situation, urban public spaces need to get rejuvenated through the infusion of the sense of connection, emotional attachment, aesthetic sensitivity that promotes public interaction and exchange. Considering the scenario, the present paper aims to explore the possibilities of integrating art in urban design to rejuvenate public spaces and promote happiness among the stakeholders. The findings of the paper argue and further establish that the installation of the artistic elements alters the visual perception of the space, activates public participation and involvement of the local community, which finally aids to rejuvenate local identity associated with the public spaces. To establish the proposed argument, the paper assesses the public spheres of the first planned city of India, namely Chandigarh, and attempts to demonstrate the potential of art elements of design along with physical infrastructure in securing happiness and urban rejuvenation. Assessment of the public spaces of Chandigarh, the happy city of India, confirms the perception that only integrated application of infrastructure and art elements of design can ensure good imageability and secure happiness through balanced urban rejuvenation.

Key words: urban art, imageability, urban space design, public space, art and rejuvenation

Streszczenie

Włączenie sztuki do projektowania urbanistycznego w celu zrównoważonej rewitalizacji przestrzeni publicznych. Studium przypadku: Chandigarh

„Przestrzeń miejska” oznacza synergię przestrzeni w krajobrazie miasta i jej elementów strukturalnych lub kompozycyjnych tworzonych przez społeczne i instytucjonalne czynniki. Współczesne przestrzenie publiczne coraz częściej pełnią różnorodne funkcje odpowiadające ściśle działaniom i potrzebom użytkowników, począwszy od fizycznych, społecznych, po psychologiczne i estetyczne. Takie przestrzenie publiczne dynamizują życie społeczne, dlatego też muszą być projektowane w sposób, który promuje zdrowe interakcje i dobre samopoczucie mieszkańców.

Niestety we współczesnych rozwiązaniach miejskich szybko rosnąca populacja wypełnia otwarte przestrzenie w mieście, czyniąc je bardziej klaustrofobicznymi, ciasnymi i uciążliwymi, co dodatkowo wpływa na zdrowie fizyczne i psychiczne ludzi. W rezultacie zarówno czynniki reprezentacyjne, jak i społeczne związane z publicznymi i półpublicznymi przestrzeniami miejskimi zostają zdławione. Dlatego, aby poradzić sobie z tą sytuacją, miejskie przestrzenie publiczne muszą zostać odnowione poprzez wprowadzenie poczucia więzi społecznych, emocjonalnego przywiązania, określonej wrażliwości estetycznej, które promują publiczne interakcje. Biorąc to pod uwagę, autorzy niniejszego artykułu postawili sobie zadanie zbadania możliwości włączenia sztuki do projektowania urbanistycznego w celu rewitalizacji przestrzeni publicznych i podnoszenia odczucia szczęścia wśród korzystających z przestrzeni miejskich. Wyniki pracy dowodzą, że wprowadzenie elementów artystycznych zmienia wizualną percepcję przestrzeni, aktywizuje partycypację społeczną i zaangażowanie lokalnej społeczności, co ostatecznie pomaga odnowić lokalną tożsamość związaną z przestrzenią publiczną. Za przykład posłużyły przestrzenie publiczne pierwszego planowanego miasta we współczesnych Indiach, tj. Chandigarh. Próbowano w nich wykazać potencjał elementów artystycznych w powiązaniu z infrastrukturą technologiczną w projektowaniu urbanistycznym. Ocena przestrzeni publicznych Chandigarh, szczęśliwego miasta Indii, potwierdza, że tylko zintegrowane zastosowanie infrastruktury i elementów sztuki w projektowaniu urbanistycznym może podkreślić pozytywny wizerunek i przynieść zrównoważoną rewitalizację miasta.

Słowa kluczowe: sztuka miejska, wizerunek, projektowanie przestrzeni miejskiej, przestrzeń publiczna, sztuka i rewitalizacja



Leogang (Austria), Senhoog hotel complex,
north façade, design and construction
management by W2 Manufaktur,
Bmstr. A. Walzl, arch. B. Krynicka
(drawing by B. Krynicka)

Leogang (Austria), kompleks hotelowy
Senhoog, elewacja północna, projekt
i prowadzenie budowy W2 Manufaktur,
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