



Dynamics of Performing Aesthetics in Architecture: A Critical Study

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Abstract: In architecture, *Venustas* (aesthetics) is always considered an important attribute along with *Firmitas* (firmness) and *Utilitas* (usefulness). Pursuing aesthetics/beauty is one of the architect's primary roles. However, it is critical to comprehend 'What is aesthetics?' and its implications for the built-unbuilt environment and human beings. In a world where everything is changing, are the definitions, concepts, and parameters of aesthetics consistent? Is it subject to change over time? If so, should architectural students and professionals be aware of it and trained in it? This study aims to critically assess and analyse the dynamic aspects of aesthetics from 3300 BCE to present and establish the 'best fit' definition of aesthetics in architecture. The methodology used for the study is a mixed-method approach, a comprehensive analysis of relevant literature to investigate the origin of aesthetics and aesthetics in philosophy, environmental psychology and architecture. The aspects, criteria and sub-criteria identified from the analysis. The consensus is taken from expert interviews and a questionnaire survey (n=72). Findings reveal that aesthetics in architecture is dynamic/ ever-changing. It has nine contributing aspects that make aesthetics a performing aesthetics that emphasises the enhanced *worth and value* for money invested. These nine aspects are a spatial organisation, functional efficiency, social, psychological, environmental, maintenance, sustainability, technology, and economics.

Keywords: Aesthetics; Beauty; Environmental psychology; Architecture; Aesthetic performance.

1. Introduction

There are many connotations to aesthetics Populuxe aesthetics, Minimalistic aesthetics, Modernist aesthetics, Postmodern aesthetics, Social aesthetics, Environmental aesthetics, Sustainable aesthetics, Economic aesthetics, Feminist aesthetics, Native American aesthetics, African aesthetics, Asian aesthetics, experimental aesthetics, Aesthetics of everyday object, Universal value of aesthetic experience.

Aesthetics is relative and varies in a pluralistic and globalised world according to the respective culture. It is also intertwined intrinsically with the performance of the built form that can be objectively assessed, with cost-benefit analysis playing a significant role in investments. Further, performance requirements like energy efficiency, carbon footprint, sustainability, indoor air quality, and disaster response have become mandatory today for small residences to large projects. Each client demands high-value designs and the current legal and rating systems prescribe concurrence with demanding indices. In this scenario, the only practical way forward is to look for a performing architecture where aesthetics is a manifestation of the overall adherence to the dynamic requirements of a built form. In this context, the present research aims to find a 'best fit' definition of performing aesthetics along with its aspects for the 21st century.

1.1 Research Question

What is the 'best fit' definition of aesthetics along with its aspects and indicators for the 21st century?

1.2 Objectives

1. To study the origin of aesthetics and its relevance in architecture, philosophy, and environmental psychology to understand the dynamism in the performance of built forms.
2. To identify the aspects and indicators of aesthetics in architecture.
3. To take a consensus regarding the definition of performing aesthetics and its aspects among experts.

2. Methods and Data

The study employs a mixed-method approach that includes a comprehensive literature review on the origins of aesthetics, its relevance in philosophy and environmental psychology, and architecture. Experts' opinions are sought to develop a definition of performing aesthetics and its aspects, criteria, and sub-criteria for architecture. Fig. 1 shows the detailed research framework for the study.

3. Changing Aspects of Aesthetics

Although the original meaning of aesthetics was condensed in perception, many different criteria contribute to the overall perception of the built environment and the opinion as to whether it is aesthetically pleasing. Aesthetics in architecture is actively pursued in Philosophy and Psychology by scholars like (Guilfoil, 1991; Lang, 1984; Roger Scruton, 1979). Even though many scholars debated on aesthetics in architecture, their interpretations revealed that the primary emphasis was on the artistic aspects of architecture. They preferred to look at the sculptural or monumental aspects, which are static aspects of architecture.

In modernism and its variation, aesthetics is concerned with Gestalt principles, Gibson's concept of "affordance" (Gibson, 2014), Berlyne's "theory of aesthetic response" (Berlyne, 1971; Chmiel & Schubert, 2017; Marin et al., 2016; Martindale et al., 1990), Kaplan's "quality predictor" (Kaplan & Kaplan, 1989; Roessler, 2012). Architecture has evolved over the year, starting from prehistoric to 21st Century, emphasising artistic, social, political, technological, ecological, environmental, sustainable parameters.

The prehistoric architecture was a shelter with a simple geometric form. Ancient rulers created a monumental form to show their power; *architecture of power and politics*. Classical architecture is vital for its logic and order, especially in terms of proportions, organisation, symmetry and order; *more mathematical and human body-based* (Fig. 2 and Fig. 3) (Ghom & George, 2021). Byzantines, on the contrary, was transitional because of their constructional advancement and the strong influence of religion. The romanesque architecture further flourished because of structural advancement. Gothic architecture can be considered skeleton structure where structure became asymmetrical with flying buttress. Walls became light and transparent because of stained glass (Fig. 4). Renaissance art was born out of an emerging culture; its search for realism and scientific excellence culminated in some of the most significant arts, science, architecture, and philosophy works and accomplishments. Renaissance architecture returns to classical ideas of ancient Greek with technological advancement (Fig. 5). Baroque had complex, surprising, dynamic forms with extensive ornaments. Art of illusion became a part of Baroque architecture (Fig. 5). Rococo was more secular and light-hearted, emphasising privacy rather than public grandeur (Fig. 6). Neoclassicism kept its classical roots and coexisted with its far opposite Romanticism art style. Neoclassical-era artists superseded religious and mythological objects with realistic, simplistic, and bold ones (Fig. 7). Art Nouveau architecture was short-lived, and it was a precursor to modernism, stressing 'function over

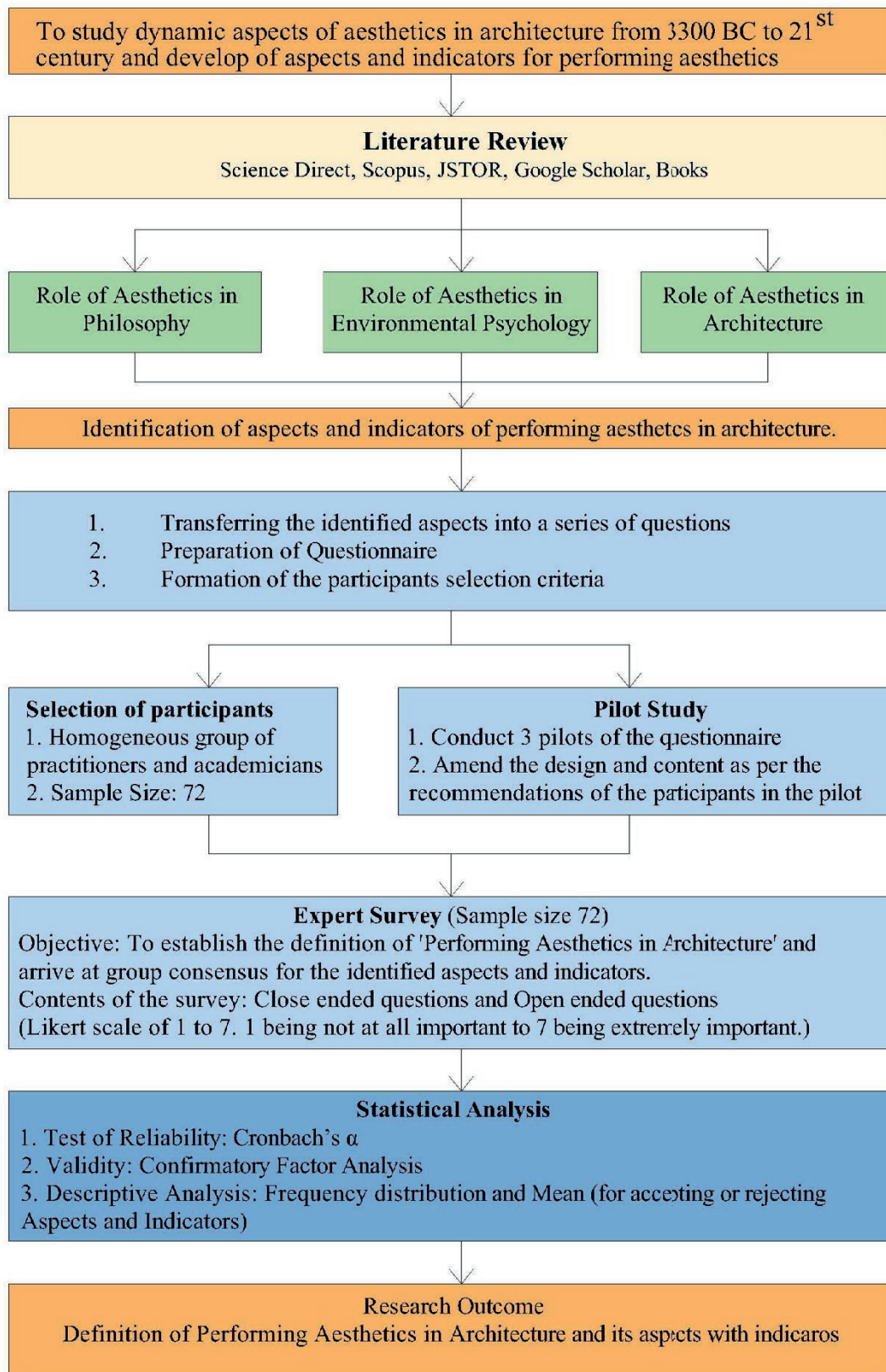


Figure 1 | Research Framework (Source: Authors).



Figure 2 | Ancient Greek Architecture - Classical Architecture (History Hit, 2020). Prominent Aspects: Symmetry, Order, Proportion, Optical corrections, Social and cultural influence.



Figure 3 | Ancient Roman Architecture: Colosseum and Aqueducts – Classical Architecture (Gill, 2019). Prominent Aspects: Firmitas (Strength), Utilitas (Functionality), and Venustas (Aesthetics).

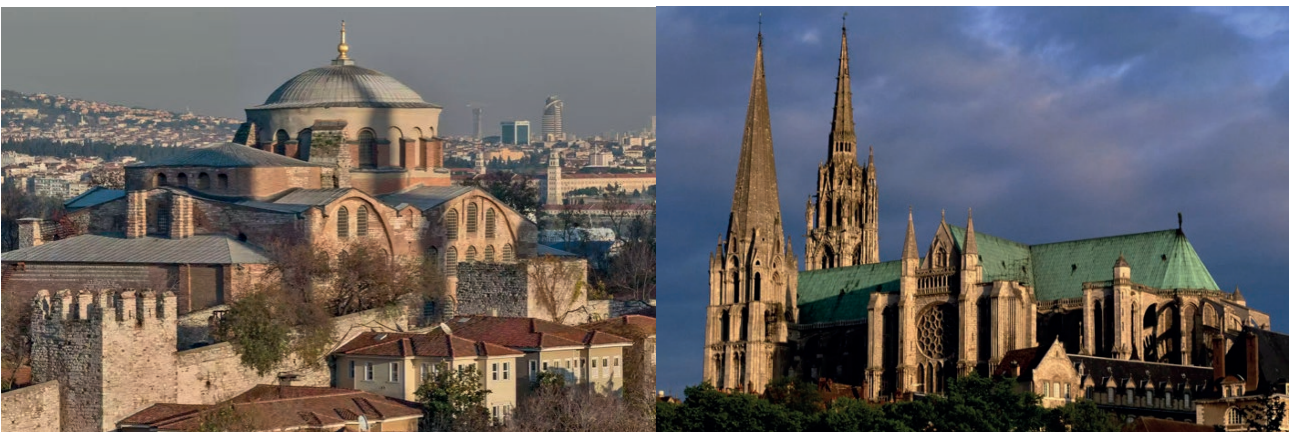


Figure 4 | Byzantine Architecture – Hagia Irene and Gothic Architecture – Chartres Cathedral (Cram, 2021; Craven, 2019). Prominent Aspects: Symmetry: major axis, minor axis; Use of textures; Orders; ornamentation; The play of light, Verticality and dominance; Religious considerations of a great god and minute humans; Airy; Natural light; Intricate and delicate ornamentation; Flying buttress and stability; Technological aspect, Eclectic style.



Figure 5 | Renaissance Architecture – Saint Peter's Basilica, Rome and Baroque Architecture – Palace of Versailles (Carney, 2021; Marinho, 2020). Prominent Aspects: Spatial organisation, Humanism; Naturalism; Secularism; Technological aspects; Functional aspects: space, User comfort.



Figure 6 | Rococo Architecture – Catherine Palace, Russia (saint-petersburg.com, 2020). Prominent Aspects: youthful art, more secular and light-hearted.



Figure 7 | Neoclassical Architecture – US Capitol building, Washington, D. C. Prominent Aspects: Monumental scale, Geometric simplicity, Use of Greek and Roman details, Dramatic use of columns.

form' and eliminating superfluous ornamentation/distinct decorative style (Fig.10). Beaux-Arts architecture was originated from Ecole des Beaux-Arts, mixing Greek, Roman with Renaissance concepts (Fig.9). Gothic revival had a *picturesque* quality. After World War II, Art Deco embraced the modern world and technology and created the vision of the machine age. Modernism in architecture started with the "industrial revolution with the manufacturing of new materials, the invention of advanced construction techniques furthermore the growth of the cities" (Craven, 2018). AD 1965 to AD 2000 is an era of pluralism that witnessed the emergence of pluralistic notions and globalism facilitated by fast modes of travel, communication and technologies. However, the Bauhaus Manifesto supported "creative planning, designing, drafting, and construction collaborations" (Craven, 2018) rather than any architectural style. As Walter Gropius said, "Good architecture should be a projection of life itself, and that implies an intimate knowledge of biological, social, technical, and artistic problems" (Gropius, 1937). While talking about excessive ornaments, Architect Philip Webb complained to his biographer William Richard Lethaby that an over-elegant grate was "hardly fit for holy fire" (Lethaby, 1935). With time focus of architecture kept on changing to different aspects, according to the need. "Form follows function" to "less is more" to "less is bore" to Structural integrity, and to integrate buildings into the site and local culture.

Architect Wagner wrote in his book, "All modern creations must correspond to the new materials and demands of the present if they are to suit modern man; they must illustrate our better, democratic, self-confident, ideal nature and take into account man's colossal technical and scientific achievements, as well as his thoroughly practical tendency" (Wagner, 1902). Architectural aesthetics are distinct from other art forms. Architecture being utilitarian art, with artistic and function purposes together. The discussion of aesthetics or beauty in architecture requires certain aspects, such as functional and social roles (Hillier, 1996). Architecture is for "creating places and contexts in which social life continues." aesthetics cannot be a separate subject of discussion; function and form need to be considered holistically (Lagueux, 2004). The understanding of aesthetics arises of professionals that appreciate the "look, sense, smell, taste, and sound of objects" (Waistell, 2016). Aesthetic experience plays an essential role "in organisational practice, not only as a symbolic context but as an integral part of the functional aspect" (Ewenstein & Whyte, 2007).

Twentieth philosopher George Santayana offered an introduction to architectural theories of aesthetics. In aesthetics, he distinguished three values: "sensory, formal, and symbolic. Sensory values include touch,

smell, taste, sound, and sight; formal values include the order of sensory materials; and symbolic values referring to expression or associative values, including aesthetic, practical, and negative values." Santayana specified that "a beautiful environment is one that gives pleasure to its beholder" (Cho, 2013; Lang, 1984).

The chronological development of aesthetics in architecture reveals that architecture is an art of interdependence. Different aspects interact with time, place, space, materials, and are functional, technological, environmental, sustainable, economical, maintainable, and follow the legal and regulatory framework. Every emerging trend in architecture is a dynamic state manifested in the built form.

The fundamental challenge of the times is to define aesthetics *since it is dynamic, keeping abreast with trends in vogue with different aspects of concern*. However, fluctuations in the concerns and changes in such considerations must be studied in the long run to understand and predict its future trends. Architecture has evolved through the Industrial Revolution, World War I and II, climate change, globalisation, pandemics, and natural and manmade hazards. Aesthetics in architecture thus follows trends accordingly (Fig. 16).

The period of the first Industrial Revolution (1760-1840) was characterised by the requirement for machinery and mechanisation in production and construction. The standard of living also improved. The major architectural styles of this era were Pombaline (anti-seismic and prefabricated), Gothic revival, and Neo-classical (Fig. 8) (Benevolo, 1984; Palmer, 2008).

The second Industrial Revolution (1870-1914) is known as the age of science and mass production. Maximum economic growth happened until World War I. The major architectural styles in this era were Romanesque, National Romantic, Prairie, Beaux-arts, and Art Nouveau (Benevolo, 1984).

World War I (1914–1918) shattered empires and supported independence movements in various colonies. Mass production methods were developed during the war. Innovations like electricity, radio and phones also occurred during this period. The major architectural styles in this era were Expressionist architecture and Futurist architecture (Fig. 11) (Benevolo, 1984).

Buildings during the World War II (1939–1945) were based on standard plans designed for a quick and inexpensive construction. The major architectural styles were Modernism, Nazi architecture, Fascist architecture, Usonia, and International Style (Fig. 12) (Benevolo, 1984).



Figure 8 | Pombaline Architecture – First Earthquake Safe Architecture in Europe and Gothic Revival Architecture - fiercely angular twin spires of Sint-Petrus-en-Pauluskerk after First Industrial Revolution (Cityseeker, 2020; Mishkov, 2020). Prominent Aspects: Pombaline Architecture - Early anti-seismic architecture features and methods of initial prefabricated construction. Gothic Revival Architecture - *Outcry against the use of machines and factory production; emphasis on light and ornamentation, Picturesque' quality.*



Figure 9 | Beaux-arts Architecture - Grand Palais and Prairie Style Architecture – Robie House, Chicago after Second Industrial Revolution (Lori, 2021; Perego, 2017). Prominent Aspects: Beaux-arts Architecture - *The Gilded Age of Architecture: when Industrialists became rich. Spatial organisation, Surface articulation with emphasis on ornamentation, Technological aspect, Navigation.* Prairie Style Architecture – *Democratic architecture for common people, Spatial organisation: massing and geometric composition, Surface articulation, Environmental Aspects: Context and Climatic consideration, Functional Aspects, Economic Aspect, Cognitive properties: Meaningfulness, Clarity, Friendliness, Functional efficiency: Space, User comfort, Accessibility, Flexibility, Effectiveness, Material from sustainable sources.*



Figure 10 | Art Nouveau Architecture Casa Batlló in Barcelona, Spain by Antoni Gaudí after Second Industrial Revolution (CC-BY-SA IGO 3.0, 2020; Clericuzio, 2017; Hohenadel, 2021). Prominent Aspects: Making use of new technologies for a highly ornamental, elaborate style.

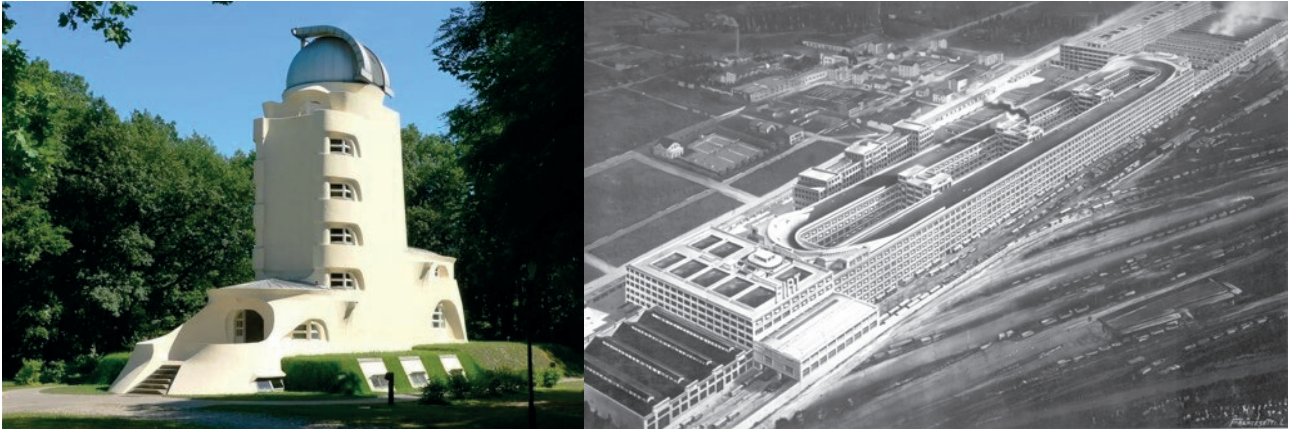


Figure 11 | Expressionist Architecture - Einstein Tower, Germany by Erich Mendelsohn and Futurist Architecture - Lingotto Factory, Italy by Giacomo Matté-Trucco and Renzo Piano after World War I (Laura, 2020; Merin, 2013; RPBW Architects, 2018). Prominent Aspects: Expressionist Architecture - Protest against the academic architecture; Function follow form; Express feelings of the viewer, inner sensitivities. Futurist Architecture - Anti-historicism.



Figure 12 | Fascist Architecture - Palazzo di Giustizia (Justice Palace), Italy by Marcello Piacentini and Stalinist Architecture - Lomonosov Moscow State University, Russia during World War II (Mafi, 2016; The Architect's Dairy.com, 2019). Prominent Aspects: Fascist Architecture - After World War I, fascist architecture reflects fascist political ideology in Italy; Fascist architecture is a reflection of absolute power. Stalinist architecture - connected with socialist realism; Stalinist architecture depicted power, the image of a strong Soviet Union, thus monumental proportions, symmetry, and minimal ornamentation.



Figure 13 | Modern Architecture – Villa Savoye, France by Le Corbusier and Post Modern Architecture – Portland building by Michael Graves during Third Industrial Revolution (Archeyes, 2020; Lynch, 2018; Meijer, 2014). Prominent Aspects: Modern Architecture: Use of new and innovative technologies of construction, It is a reimagination of how humans would live, work and interact. Simplicity, Functionality, Behaviouralist approach. Post Modern Architecture: Postmodernism responds to modern architecture's rigidity, formality, and lack of diversity Combines new ideas with traditional forms.



Figure 14 | Critical Regionalism – Jawahar Kala Kendra, India by Charles Correa and Andrews Gunj Housing, India by S. K. Das (Bahga & Raheja, 2018). Prominent Aspects: Commitment to *place* rather than space; Based on local climate and culture Critical regionalism is a progressive approach to design, a confluence of architecture’s global and regional language.



Figure 15 | Sustainable Architecture – Suzlon One Earth Global Corporate Headquarters, India by Christopher Benninger (Christopher Benninger Office, 2019). Prominent Aspects: The objective of sustainable architecture is to minimise the ill-effects of construction on the environment.

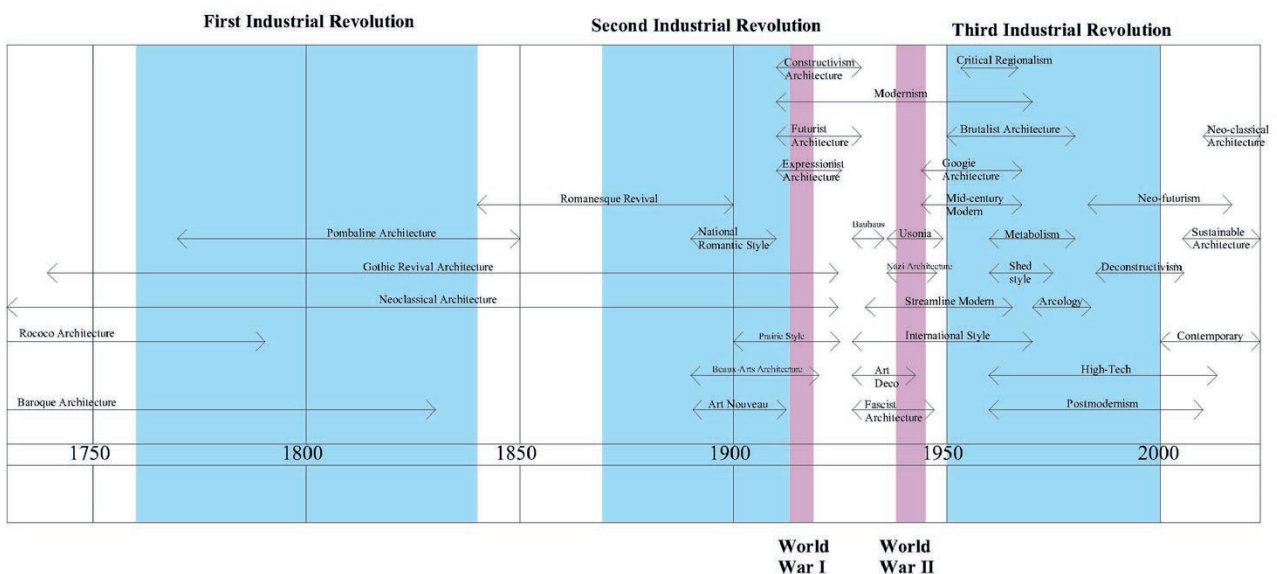


Figure 16 | Timeline of events that influenced the dynamics of aesthetics in architecture (Source: Authors).



Figure 17 | Aspects and indicators of performing aesthetics (Source: Authors).

The third Industrial Revolution (1950–) is a digital and communication technologies revolution. Both have had a distinct effect on world economies, as well as on media and social, political, cultural, and educational areas. The digital medium has dramatically changed the way buildings are drawn and detailed (Figs. 13, 14 and 15) (Benevolo, 1984).

In the 21st century, what the society needs is performing aesthetics, which will have spatial, functional, socio-economical, environmental, sustainable benefits with legal and regulatory aspects. Aesthetics in classical consideration is different now. It is pluralistic, and changed due to technological innovation.

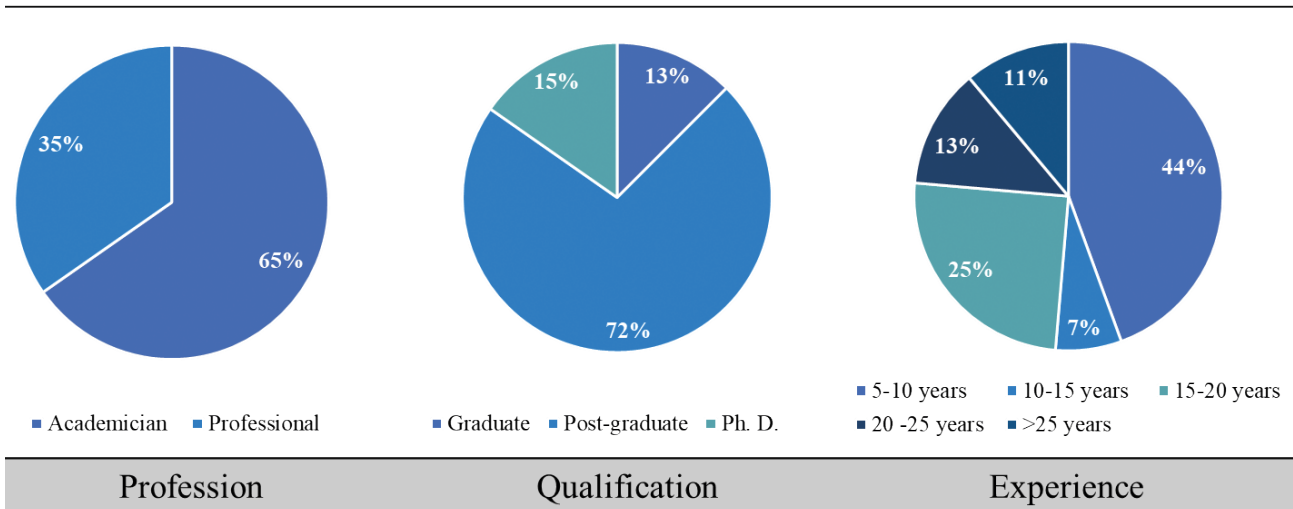


Figure 18 | Profession, qualification, and experience of the experts (Source: Authors).

4. Aspects and Indicators of Performing Aesthetics

The historical overview revealed nine aspects of performance aesthetics in architecture: spatial organisation, functional efficiency, social and psychological dimensions, environmental aspect, maintenance, sustainability, technological aspect, economic, legal and regulatory framework, each with its own set of criteria and sub-criteria and sub-sub-criteria (Fig. 17).

5. Development of Aesthetic Aspects in Architecture

5.1 Sample Size

The proportion method was used to determine the sample size. Academicians from renowned institutions with more than five years of experience and adequate knowledge of aesthetics in architecture; practicing architects with more than five years of experience and a sufficient number of projects was the criterion for selecting respondents. Since the exact proportion of respondents meeting this criterion is unknown, a worst-case scenario was used to decide the sample size. It was assumed that 50% of the population will meet this criterion. Hence p (the portion of the population respondent meeting the eligibility criteria) is 0.5 and q is 0.5.

$$\text{Thus } q = 1 - p = 0.5.$$

$$N = \frac{z^2 \times (p \times q)}{e^2} \tag{1}$$

where, z is the standard score associated with 90% confidence level. Hence standard scores equal to 1.645. $p \times q$ is the variability in the data set, which is computed using the worst-case scenario $(0.5 \times 0.5) = 0.25$. e is the tolerable error; 10% in the current study.

$$\text{Sample size } n = 67.5 \text{ (68)} \tag{2}$$

To deal with non-responses, 20% of the sample size was taken as a buffer that included

$$68 \times 0.20 = 13; 68 + 13 = 81 \tag{3}$$

Questionnaires were distributed to 81 experts; however, nine questionnaires were discarded for incompleteness. Hence the final sample size was 72.

Figure 18 shows the percentage distribution of professions (65% academicians; 35% professionals). Most respondents (72%) were postgraduates (followed by PhDs and graduates). In terms of experience, 44% had 5-10 years of experience, 7% had 10-15 years of experience, 25% had 15-20 years of experience, 13% had 20-25 years of experience, and 11% had more than 25 years of experience.

5.2 Reliability and Validity

Quality assessment tools such as reliability and validity were used to measure the quality of the measurement instrument.

5.2.1 Reliability for Aesthetic Aspects

Table 1 | Test of Reliability: Cronbach's (α).

Sr. No.	Construct	No. of Scale Items	(α)
1	SO: Spatial organisation	13	0.94
2	EP: Environmental parameter	14	0.93
3	LRF: Legal and rating framework	02	0.85
4	SPD: Sociological and psychological dimension	28	0.99
5	TA: Technical aspect	03	0.83
6	FE: Functional efficiency	18	0.98
7	SA: Sustainability aspect	05	0.94
8	MA: Maintenance aspect	02	0.97

The Cronbach's α value for all constructs was above the threshold of 0.7 ($0.9 > 0.7$), indicating a very high level of internal consistency for the measurement scale (Table 1).

5.2.2 Validity for Aesthetic Aspects in Architecture

Test of Validity: Confirmatory Factor Analysis

Confirmatory factor analysis is used to test whether measures of a construct are consistent with researchers' understanding of the nature of the construct.

Table 2 | Test of Validity.

Sr. No.	Construct	Factor loading	AVE
1	SO: Spatial organisation	13	0.59
2	EP: Environmental parameter	14	0.53
3	LRF: Legal and rating framework	02	*
4	SPD: Sociological and psychological dimension	28	0.75
5	TA: Technical aspect	03	0.77
6	FE: Functional efficiency	18	0.74
7	SA: Sustainability aspect	05	0.75
8	MA: Maintenance aspect	02	*

*constructs have insufficient indicator to carry out confirmatory factor analysis.

Standardised regression weights are used to assess the factor loadings. Each of the twelve measured indicators for spatial organization has factor loadings above 0.5, indicating that they define the constructs of the spatial organisation. AVE is above 0.5, indicating construct validity.

Validity test for maintenance, economic aspect and legal and regulatory framework:

Indicators for the legal and regulatory framework, maintenance, and economics are insufficient. Thus, Lawshe's (1975) content validity ratio is used to compute the

validity index and validate these variables. It is used to assess expert consensus on the importance of a given item. Experts were asked to rate each item on a 3-point scale: 'essential,' 'useful but not essential,' or 'not necessary'. To be considered valid, an instrument must have a content validity ratio (CVR) of 0.741 or higher (for 0.05, two-tailed test, and seven experts) (Wilson et al., 2012). For Maintenance and economy aspects, the content validity ratio (CVR) is 1, and the Legal and Regulatory framework content validity ratio is 0.75.

6. Expert Survey results for the Consensus for the Aspects of Performing Aesthetics

The expert survey included both open- and closed-ended questions. Except for complex planning, monumental scale, ornamentation, and the art of illusion, all experts agreed with the identified aspects of performing aesthetics in architecture. Table 3 shows the descriptive statistics, histogram plots, and decisions on the aspects of performing aesthetics.

7. Discussion and Conclusion

According to studies, the five historical milestone events in the evolution of aesthetic in architecture are the first Industrial Revolution, second Industrial Revolution, World War I, World War II, and third Industrial Revolution, which served as turning points in phenomenal transformations in aesthetics in architecture (Fig. 16). There is a rising need for knowledge and technology-based society, with multiple facets integrated into architectural productions. Such intrinsically integrated architectural productions are the appropriate, high-value response to the needs that vary from time to time.

However, on a closer look, it is clear that functionality, performance, and derived concepts of beauty remain the central pillars around which all other requirements revolve and develop. This critical study also shows that aesthetics in architecture in 21st century has emerged to a complex integration of multidisciplinary fields, manifesting new theoretical propositions on aesthetics in architecture that are not only apparent visually, but also measurable and performance-oriented with the common threads retained. From the paradigm shift from the classical period to the 21st century, architectural aesthetics should have performance efficiency, acceptance, monetary worth, and meaningfulness. Thus, architects as creators have increased responsibility to ensure an acceptable performance of expression in built forms.

Table 3 | Expert Survey results for the Consensus for the Aspects of Performing Aesthetics.

Sr. No.	Questions	Frequency	Mean	Std. Deviation	Decision
1	Building performances is a determinant of the aesthetic value for making a preference	68.1	5.14	1.42	Somewhat agree
2	Aesthetics in architecture is a harmonious amalgam of technology, performance, and design considerations	97.2	6.10	0.77	Agree
3	With the world is entangled in energy and water crises, design parameters of optimisation of energy and water in the built environment will enhance the overall aesthetic value	84.8	5.76	1.18	Agree
4	Aesthetically pleasing architecture should contain other building systems with the best performance	69.5	5.31	1.35	Somewhat agree
5	Sociological and psychological performance criteria are essential determinants in deciding the aesthetics of a built form	91.7	5.89	0.90	Agree

Performing Aesthetics Aspects, Criteria, and Sub-criteria

Sr. No.	Questions	Frequency	Mean	Std. Deviation	Decision
01	Spatial organisation	97.1%	6.26	0.822	Agree
1.1	Massing and geometric composition	91.4%	5.81	1.070	Agree
1.1.1	Humane scale	91.4%	6.19	1.070	Agree
1.1.2	Play of light	94%	6.03	1.074	Agree
1.1.3	Built to un-built proportion	91.4%	5.86	1.248	Agree
1.1.4	Uniformity, proportion, symmetry, modularity, harmony	85.7%	5.65	1.023	Agree
1.1.5	'Picturesque' quality	74.3%	5.08	1.44	Somewhat agree
1.1.6	'Divine ratio'	65.7	4.89	1.614	Somewhat agree
1.1.7	Asymmetrical, geometric complexity, domed roof, arches, pier	71.4	4.78	1.44	Somewhat agree
1.1.8	Complex, surprising, dynamic floor plans	67.1	4.9	1.646	Somewhat agree
1.1.9	Art of illusion	54.1	4.43	1.608	Somewhat agree
1.1.10	Monumental scale, grandiosity	55.6	4.42	1.732	Somewhat agree
1.1.11	Ornamentation	62.9	4	1.501	Somewhat agree
1.2	Surface articulation	81.5	5.54	1.198	Agree
2	Functional efficiency		6.14	1.052	Agree
2.1	Space				
2.1.1	Uses	94.5	6.06	0.948	Agree
2.1.2	Openness	93.1	6.04	0.971	Agree
2.1.3	Proportion	95.8	5.97	0.934	Agree
2.1.4	Sizes	88.9	5.88	0.978	Agree
2.1.5	Variety	80.6	5.61	1.120	Agree
2.2	Accessibility	95.8	6.25	0.884	Agree
2.3	User comfort and control				
2.3.1	Lighting	98.7	6.54	0.670	Agree
2.3.2	Comfortable	98.6	6.44	0.710	Agree
2.3.3	Acoustics	98.6	6.18	0.699	Agree
2.3.4	Appropriate	95.8	6.06	0.854	Agree
2.3.5	User-controlled thermal climate	93.1	5.92	0.989	Agree
2.4	Adaptability				
2.4.1	Adaptable to changing needs	93.1	5.89	0.925	Agree
2.4.2	Allows changes of use	86.2	5.78	1.010	Agree
2.5	Effectiveness				
2.5.1	Meeting users' needs	93.1	6.15	1.083	Agree
2.5.2	Enhances user activity	93.1	6.10	1.140	Agree
2.5.3	Organisational efficiency	93.1	5.99	1.094	Agree
3	Social and psychological dimension		6.08	0.818	Agree
3.1	Discovering properties that evoke pleasure and sensation	93.3	5.88	0.903	Agree
3.1.1	Use of Gestalt Principles				
3.1.1.1	Order	88.8	5.76	1.107	Agree
3.1.1.2	Continuation	91.6	5.74	0.993	Agree
3.1.1.3	Figure/Ground	87.5	5.67	1.035	Agree

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Sr. No.	Questions	Frequency	Mean	Std. Deviation	Decision
3.1.1.4	Closure	87.5	5.51	1.021	Agree
3.1.1.5	Proximity	86.1	5.47	1.100	Agree
3.1.1.6	Similarity	84.7	5.35	1.009	Agree
3.1.1.7	Symmetry	68.1	5.08	1.297	Agree
3.1.2	Cognitive properties				
3.1.2.1	Meaningfulness	88.9	5.93	0.998	Agree
3.1.2.2	Friendliness	94.4	5.93	0.811	Agree
3.1.2.3	Clarity	87.5	5.81	1.10	Agree
3.1.2.4	Originality	83.3	5.88	1.113	Agree
3.1.2.5	Ruggedness	90.2	4.67	1.061	Somewhat agree
3.1.2.6	Mystery	50	4.44	1.352	Somewhat agree
3.1.2.7	Complexity	47.1	4.25	1.275	Somewhat agree
3.2	Navigation	94.4	6.14	0.893	Agree
3.2.1	Circulation				
3.2.1.1	Entry & exit points	98.6	6.36	0.810	Agree
3.2.1.2	Circulation within the building	95.8	6.25	0.900	Agree
3.2.1.3	Pedestrian & vehicular movement	94.5	6.17	1.012	Agree
3.2.1.4	Overall building activity	95.8	6.14	0.844	Agree
3.2.1.5	Integration of building services	93	6.13	1.074	Agree
3.2.1.6	Durability and flexibility to avoid premature failure and obsolescence.	84.8	5.99	1.261	Agree
3.2.1.7	Circulation outside the building	91.7	5.89	1.001	Agree
3.2.2	Signage				
3.2.2.1	Clear	90.3	6.11	1.082	Agree
3.2.2.2	Welcoming signage	84.7	5.96	1.283	Agree
3.2.2.3	Bilingual	86.1	5.88	1.186	Agree
3.2.2.5	Brail signage	83.3	5.88	1.310	Agree
4	Environmental parameter	91.7	6.03	0.978	Agree
4.1	Context and location	92.9	6.15	1.057	Agree
4.1.1	Urban and social integration	98.6	6.24	0.711	Agree
4.1.2	Contributes to environment	95.7	6.20	0.861	Agree
4.1.3	Contributes/connects to neighbourhood	95.8	6.16	0.862	Agree
4.1.4	It is seen as a place, not just as a building integrating itself in the surrounding, whether its historical or climatic context.	92.9	6.03	0.963	Agree
4.2	Climatic consideration	88.9	5.94	1.243	Agree
4.2.1	Sitting	97.2	6.15	0.833	Agree
4.2.1.1	Natural lighting	98.7	6.54	0.670	Agree
4.2.1.2	Macro-climate, micro-climate	97.2	6.29	0.911	Agree
4.2.1.3	Geological factors	93.1	6.08	1.084	Agree
4.2.1.4	Adjacent buildings	95.8	5.85	0.883	Agree
4.2.2	Build for energy play	94.5	6.14	0.997	Agree
4.2.2.1	Rainwater harvesting, solar collector, sundial, windmill	94.4	6.22	0.953	Agree
4.2.2.2	New 'green' technology such as intelligent facades	95.8	5.96	1.156	Agree
5	Maintenance		5.99	1.081	Agree
5.1	Ease of maintenance	94.4	6.15	1.096	Agree
5.2	Durability	93	6.15	1.096	Agree
6	Sustainability parameter		5.89	1.042	Agree
6.1	Materials from sustainable sources	98.6	6.18	0.718	Agree
6.2	Use of recycled and renewable materials	97.3	5.94	0.918	Agree
6.3	Low-embodied-energy materials	94.4	5.97	0.888	Agree
6.4	Recycling of buildings	83.3	5.67	1.151	Agree
6.5	Design for demolition so that it will have minimum ill impact	69.5	5.06	1.383	Agree
7	Technical parameter		5.63	0.999	Agree
7.1	Built quality	95.8	6.35	0.952	Agree
7.2	Construction technique	87.5	6.15	1.083	Agree
7.3	Smart material	93	5.99	1.055	Agree

(Table 3 continued on next page)

(Table 3 continued from previous page)

Sr. No.	Questions	Frequency	Mean	Std. Deviation	Decision
8	Economic		5.32	1.208	Agree
9	Legal and regulatory framework		5.19	1.285	Somewhat agree
9.1	Building bylaws	86.9	5.71	1.272	Agree
9.2	Green rating system	82	5.54	1.212	Agree

Note: Aspects, criteria, sub-criteria and sub-sub-criteria are accepted/agreed based on the following points:

Frequency – more than 50%

Mean – more than 4

Aesthetic aspects of architecture consist of multidisciplinary fields such as artistic expression, environmental psychology, cultural and social commentaries, radical discoveries, technological innovations, performance standards and prescribed norms in various aspects such as energy, sustainability, carbon footprint, crowd behaviour, ergonomics and political discourse whereas basic architectural products address the problems of enclosure, connectivity, permanence, economics, functions, spatial organisation, and structure. The expansion of architectural design ideas and vocabulary during the 19th century has created pluralistic and diverse architectural productions with plurality in aesthetics and the considerations and concepts of beauty and aesthetics in every culture are accepted. In today's architecture, architects must ponder about the increased purchasing power of people, utilisation of new materials and technology, transition in people's lifestyles, economic worth of investments and viability, compliance with regulatory framework and demands, and philosophical variations in worldviews as these are addressed only meagrely.

This study tried to understand the new way of *performing aesthetics* in architecture. The architectural education too has to gear up so that learners are *able to practice architecture the way they are expected to*. Although the role of architects is to change the society for good and relate to their prevailing culture, contemporary architects may be assuring each other of their value. However, society perceives architecture as a *privilege or luxury* without which it can do. However, from another point of view, every place has its own identity nurtured by the architecture that exists there. These architectural productions impart a sense of identity and aesthetic appeal, and fulfil the needs and multitude of other requirements prescribed from time to time.

Outlined below are some of the points regarding performing aesthetics in architecture required for the modern world and should be incorporated in the syllabus for making students of architecture market-worthy.

- Spatial organisation:** Geometric composition and surface articulation using design elements and principles, at the same time exploring influence of the global ideas on local identities and spatial practices.
- Functional efficiency:** Space efficiency, behavioural issues, human comfort, and universal design parameters to be considered.
- Social and psychological dimensions:** Considerations regarding creating better environments. People who are affected by design and planning decisions are involved in the decision-making process.
- Environmental aspects:** Designing with nature, green standards.
- Sustainability:** Sustainability issues, sustainability norms and standards.
- Technology:** Respond to advances in building, digital, material and telecommunication technologies.
- Economic aspects:** Respond to socio-economic and social-political issues in design. Life cycle costing, maintenance, value and worth in investments.
- Legal frameworks and rating systems:** Building rules, earthquake requirements, fire and noise regulations, AQI and other performance criteria imposed from time to time.
- Durability and maintainability:** The robustness of the design, its maintainability and adaptability.

In short, performing aesthetics in architecture is a result of performing architecture by meeting parameters like spatial organisation, functional efficiency, technological aspect, social and psychological dimensions, environmental aspect, sustainability, maintenance, economic aspect, legal and regulatory framework, and various performance codes. It is not superfluous and visually pleasing architecture any more.

8. Future Scope

Aesthetics in architecture in the 21st century has shifted in favour of the evolving, complex interdisciplinary fields' demands and is developing new theoretical propositions. The interdisciplinary approach in architectural education, the effects of other fields of art and design, philosophical and psychological theories in terms of necessary perceptual and functional qualities, empowerment of the students of architecture and worth and value for the time spent in schools of architecture have been recognised as critical factors when identifying aesthetic intentions, artistic aspects, and design principles. It needs

innovative creative and critical thinking processes. Future researchers could delve into the impact of computational and artificial intelligence (AI)-oriented performing aesthetics.

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