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Architectural Design Quality Indicators for Museums and Galleries in The Indian Context

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ABSTRACT

Quality is one of the three factors that must be considered for any undertaking; the other two are time and cost. Although there are measuring instruments for both time and cost, quality cannot be objectively measured. The building is the result of design, and the quality of the structure is contingent on the quality of the design. It is essential to evaluate the design quality at various phases of a project's life cycle in order to determine how a structure performs when in use. In India, various standards, codes, and green building rating systems are used to evaluate various design elements. However, a unified framework is required to objectively evaluate design quality. This study aims to identify the criteria influencing the design quality of educational built environments and evaluate their relative significance. Using a quantitative approach and a questionnaire, data has been collected. The purpose of the survey was to obtain responses regarding the relevance of design quality indicators in the context of the educational constructed environment in India.

KEYWORDS

Architectural Design Quality Indicators, DQI, Indicators Museums & Galleries Built Environment, Design Evaluation, Design Standards, Learning Spaces, Pedagogical Requirements, User Satisfaction, Environmental Factors, Building Performance, Spatial Configuration, Aesthetics, Accessibility, Sustainability, Cultural Context

CHAPTER I: INTRODUCTION

1.1 AIM

This study aims to identify the criteria affecting the design quality of museums/galleries and assess their relative importance.

1.2 OBJECTIVE

- To review the current state of the art in the study of Design Quality Indicators
- To identify relevant design quality indicators for museums/galleries and to evaluate them on the basis of their relative significance according to architects and stakeholders.

1.3 NEED FOR THIS TOPIC

Studying design quality indicators for museums is important for several reasons:

- Enhancing visitor experience: A museum's design can greatly impact its visitors. Their facilities, exhibits, and overall layout to create a more engaging and enjoyable experience for visitors.

- Improving accessibility: Museums are responsible for ensuring that their exhibits and facilities are accessible to all visitors, including those with disabilities. By studying design quality indicators, museums can identify ways to improve accessibility and make their facilities more inclusive.
- Preserving collections: Museums house valuable collections of artifacts, artwork, and other cultural objects. The design of a museum can impact the preservation of these collections, by providing appropriate lighting, temperature, humidity controls, and security measures. Studying design quality indicators can help museums identify ways to better preserve their collections.
- Cost-effectiveness: Design quality indicators can also help museums identify ways to improve their operations and reduce costs. For example, by designing exhibits that are easier to maintain, or by using materials that are more durable and long-lasting.

In summary, studying design quality indicators for museums is crucial to ensure that they provide a high-quality visitor experience, are accessible to all, preserve collections, and operate in a cost-effective manner.

1.4 OVERVIEW OF THE TOPIC

Quality is one of the triple considerations in any project, and while there are measuring tools for both time and cost, it is important to measure the quality of design in different stages of the project life cycle. In India, standards, codes, and green building rating systems are used to judge various design aspects, but there is a need for a unified framework to measure design quality objectively.

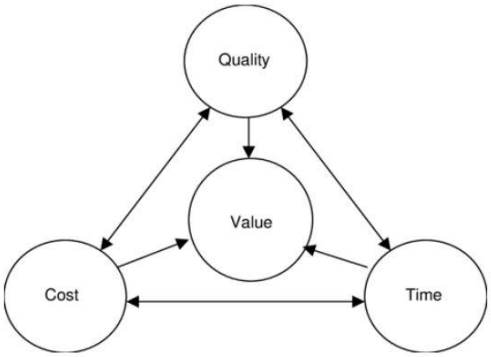

Figure 1. Value of product or service as a function of quality, cost and time

The Design Quality Indicator (DQI) is a process that enables every aspect of design quality to be assessed at each stage of the construction process, from inception to post-occupancy analysis. Through organised workshops and online resources, DQI enables stakeholders to actively collaborate with construction and design experts in creating goals for evaluating design quality. The workshops are professionally mediated by a DQI Facilitator.

For the last 16 years, DQI has been used on over 1400 projects. It has been successfully used for educational facilities, hotels, civic buildings, retail, and mixed-use buildings, sports and leisure, and workplaces.

DQI focuses on the design and construction team on the needs of the end-user as it;

1. creates a sense of ownership by engaging users throughout the process;
2. enables feedback and learning for future projects;
3. generates a simple graphic profile that indicates the strengths and weaknesses of a design or existing building;
4. provides an agenda for briefing and design reviews;

5. provides benchmarking information in the form of Facilitator's Reports
6. it helps to develop a more sustainable building

Design Quality Indicator is based on Vitruvian Principles. The Roman architect Vitruvius in his treatise on architecture, De Architectura, emphasized that there were three principles of good architecture, they are as follows:

1. Firmatas (Durability) - It should be firm and remain in good condition.
2. Utilitas (Utility) - It should be useful and functional for the people using it.
3. Venustus (Beauty) - It should be beautiful and enhance people's spirit.

The modern mind rewrote them as, Functionality (Utilitas), Build quality (Firmitus), and Impact (Venustas)

Figure 2. Components of design quality, Source: DQI.ORG

The DQI questionnaire is organised to address the issues under each of these three quality fields, they are as follows:

i) Functionality
a) Use
b) Access
c) Space
ii) Build Quality
    a) Performance
    b) Engineering Systems
    c) Construction
iii) Impact
a) Form and material
b) Urban Integration
c) Character and Innovation

DQI has 5 stages that are undertaken over the project's lifecycle.
Stage 1: Briefing Stage
2: Concept Design Stage
3: Mid-design Stage
4: Ready for occupation Stage
5: In-use

1.5 METHODOLOGY

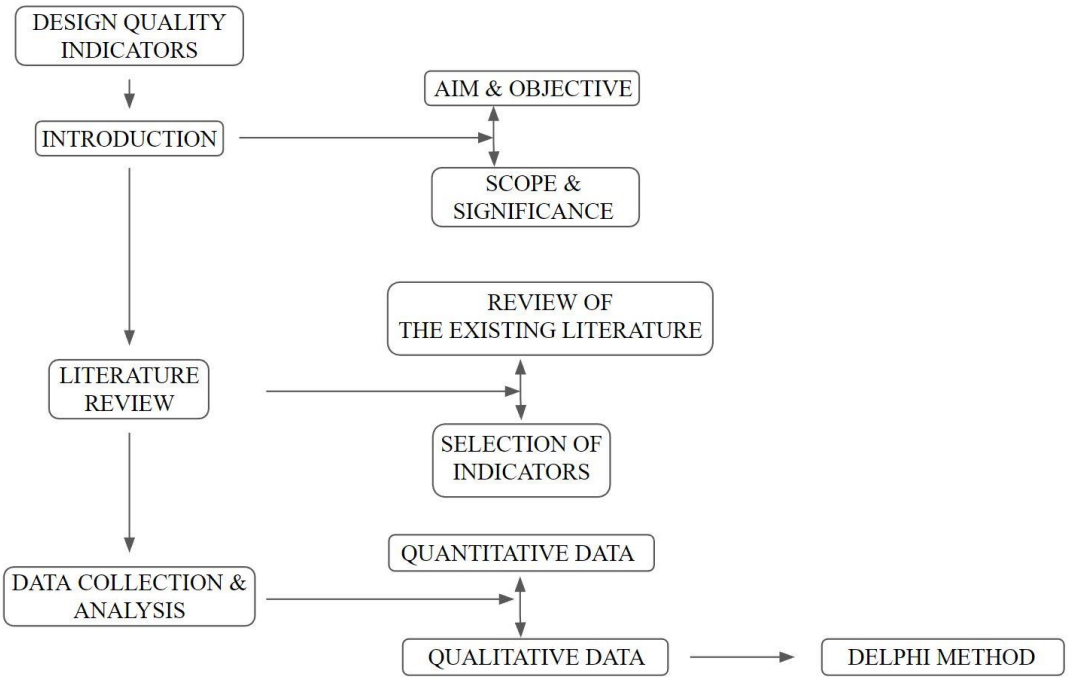

Fig 3. Methodology flow chart

1.7 SCOPE

- The scope of this study will have geographical constraints restricted to India.
- This dissertation is not aimed to be all-inclusive. It is confined to a relatively small number of examples due to the constraints of time on this academic exercise.

CHAPTER II: LITERATURE REVIEW

2.1 Introduction

The “Quality” of a building design is its ability to satisfy the needs of different stakeholders and end users. Quality is crucial in design because it directly impacts the final product's usability, functionality, and reliability. A high-quality design enhances the user experience and ensures that the product performs its intended function effectively and efficiently.

The quality design also helps build trust and credibility with users, leading to increased customer satisfaction and loyalty. In addition, a well-designed product is often more aesthetically pleasing, which can positively impact its perceived value and appeal to potential customers.

Furthermore, quality design can save time and money in the long run by reducing the likelihood of errors and minimizing the need for expensive redesigns or repairs. It can also help to avoid legal issues and negative publicity resulting from product defects or failures.

Quality is one of the three factors that must be taken into account in any project, along with time and money. While there are instruments for monitoring time and cost, quality cannot be defined objectively and is instead determined by the individual.

The value of a design to its use can be used to define design excellence.

The design could be for any kind of system, experience, product, or service. Any combination of usability, performance, aesthetics, predictability, stability, consistency, safety, and security can contribute to designing quality. Although it has a significant impact on end-user satisfaction, design quality is still at a very early level in developing nations like India. The quality of the design determines the quality of the building, which is a product of the design.

The aims of an organization must include customer satisfaction, according to ISO 9000 on total quality management.

The end users of the buildings are the main target market for the product. The level of design quality is determined by the buildings' end users' happiness or discontent. Once it is designed in accordance with local and national norms and standards, a building can function effectively. The building's efficiency is increased by the design's excellence. To understand how the building functions in use, it is crucial to assess the design quality at several points during the project life cycle. The measure can be implemented at any stage, including briefing, predesign, building, and pre-and post-occupancy. Moreover, not every design element may be given the same weight on the weighing scale.

2.2 Factors Affecting The Quality Of Design

Every project has a unique collection of requirements and constraints as well as specific cultural, environmental, technological, and aesthetic contexts that must be taken into account, each of which brings its own set of opportunities and obstacles.

Design highlights the key factors that are present in a circumstance. It involves both seeking out problems and solving them. Although each project has its own set of design influences, some of the most significant ones are-

- Clients - Some people have a distinct vision of the project's program, budget, and other goals, including the building's final appearance. Others go to their architect to set the project goals and create a building that accomplishes them. In both situations, the success of the client-architect partnership plays a significant role in selecting the final design for the project.
- Community Concerns & Surrounding Context - The surrounding built environment influences the building's configuration, material selection, colour scheme, and texture choices, as well as how site development should be approached.
- Cost Of Building Technology Implemented - The project's financial constraints or budget has a significant impact on following design choices, such as building size and configuration as well as material choice and detailing.
- Site - These considerations include the size of the site, its layout, its terrain, its geotechnical properties, its ecological qualities, such as its vegetation, wildlife habitats, water features, and drainage, and its accessibility.

- Schedule - The demands and limitations imposed by the project timeline may have an indirect impact on how well personnel performs and how certain difficulties are researched and taken into account during the construction process.

2.3 How To Measure Design Quality

Design quality has objective and subjective components, making it difficult to measure. While some design indicators can be evaluated objectively, others provide intangible assets, partly as a result of the respondents' subjective opinions, experiences, and preferences.

In any assessment of a building's design quality, whether it satisfies user requirements and what people think and feel about it are the most crucial factors. Nonetheless, it can be challenging to comprehend user viewpoints because people and groups may have various opposing and divergent opinions. Different viewpoints on the same facility are held by each project participant. With innovative briefing techniques and post-occupancy evaluation, experts and academics involved in creating the built environment have created sophisticated methods for identifying and comprehending user requirements. Numerous other instruments have been presented in the manufacturing sector, but many of them have raised doubts in the building sector about their suitability. The instrument that is specifically made for assessing the design quality of construction projects is detailed below.

2.4 Introduction To The DQI Tool

The DQI is a tool that assists a building's procurement team in defining and checking the evolution of design quality at key stages in the development process. The development of DQI has been led by the Construction Industry Council- CIC with sponsorship from the DTI, the Commission for Architecture and Built Environment- CABE, Constructing Excellence, and the Strategic Forum for Construction and with support from the Office of Government Commerce- OGC. Since its inception, DQI has been developed from a wide variety of sources to gather the best intelligence on the issue of design quality and how to assess inherent design quality.

The evaluation of a building's design excellence is a cutting-edge method. It helps create a more sustainable building by keeping the end user in mind throughout the process and focusing the team on their needs.

The DQI mainly takes the form of a questionnaire and includes questions that are pertinent at any point in a building's development. The tool can be reviewed and used again for the project's duration. The DQI should ideally be applied at each significant stage of growth; however, it can also be applied repeatedly at a single level.

Vitruvian principles are the foundation of the Design Quality Indicator. In his treatise on architecture, De Architectura, the Roman architect Vitruvius emphasised three principles of good architecture, which are as follows:

- Firmatas (Durability) - It should be strong and long-lasting.
- Utilitas (Utility) - It must be useful and functional to those using it.
- Venustus (Beauty) - It should be attractive and uplift people's spirits.

Around 1400 projects have used DQI over the past 16 years.

It has been effectively employed for schools, hotels, civic structures, shops, mixed-use structures, sports and recreation facilities, and workspaces.

2.5 Benefits Of Design Quality Indicators

The result is an improved product overall, and more significantly, the process can be learned from it because the DQI enables us to track how improvements are made.

- Once a designer has been selected, the DQI will be reviewed again. Throughout the construction phase, it will be utilized as a benchmark and incorporated as a checklist against the client's initial expectations.
- The DQI questionnaire offers a thoughtfully organized framework for the talks and brings up concerns that could otherwise have gone unnoticed. The client gained value as well because the DQI informed them of the reasoning behind our design.
- The DQI can be used as a checklist to ensure that the various end-user viewpoints have not changed, and the results from the original scheme can be used as a secondary brief for the new site.
- The DQI's "weighing" component is crucial for selecting the most significant planning and financial constraints that could not be taken into account.

2.6 Components Of Design Quality Indicators

2.6.1 DQI QUESTIONNAIRE

The DQI questionnaire is a short, simple, and non-technical set of statements that collects opinions from those involved by examining building functionality, build quality and impact.

Functionality

Building functionality is focused on how spaces are arranged, how well they operate, how they relate to one another, and how the structure is made to be practical.

It examines the three following elements

- **Use**: How well the structure supports the original and future uses that it may support.
- **Size** refers to the dimensions and relationships between the rooms or component spaces of the building.
- **Accessibility** refers to how simple it is for everyone to reach and navigate the building.

Build Quality

Buildings are judged on their overall construction quality, including their coordination, performance, and coordination of their engineering systems, fabric, finishes, and fittings.

The following aspects are evaluated:

- **Performance** refers to the mechanical, environmental, and safety systems of the building.
- **Engineering** refers to the quality of the building's elements.
- **Construction** refers to how well a structure is put together.

Impact

The influence of buildings emphasizes a building's capacity for enjoyment, curiosity, placemaking, upliftment of the local community, and contribution to the arts and sciences of building and architecture.

The following elements are part of the evaluation:

- **Character & Innovation** - What do people think of the building as a whole in terms of character and innovation?
- **Shape and materials** - the structure's physical makeup, scale, and arrangement within its confines.
- **Internal Environment** - The inside environment of the building, or how it feels there.
- **Urban & Social Integration** - Urban and social integration, or how a building interacts with its surroundings.

2.6.2 PROCESS

- Anyone can initiate the DQI, but its use must be coordinated by someone on the project delivery team.
- When a company/project team decides to use the DQI, a DQI leader is appointed to register the assessment and distribute relevant information to the respondents.
- Depending on the number of end-users in a project, the DQI should be completed by 5 to 25 DQI respondents.
- A DQI facilitator who has been trained to assist in the use of the DQI is also recommended.

2.7 Importance Of Architectural Design In Museums

Architectural design is important in designing museums for several reasons:

- Functionality: Architectural design is essential to ensuring that the museum functions effectively. The design must consider the various spaces needed to house and exhibit collections, as well as the spaces needed to support administrative and visitor services. The architectural design must also ensure that visitors can easily navigate through the museum and find their way to different exhibits and services.
- Aesthetics: Architectural design plays a critical role in the overall aesthetic appeal of the museum. The design should reflect the values and mission of the museum and be visually engaging to visitors. Aesthetically pleasing architectural designs can create a sense of wonder and curiosity in visitors, encouraging them to explore the museum further.
- Sustainability: Architectural design can also help promote sustainability in museum design. Sustainable architectural practices can help reduce the environmental impact of the museum and promote sustainable practices within the community.
- Historical and Cultural Significance: Architectural design is essential in preserving the historical and cultural significance of the museum. The design must take into account the preservation of historical and cultural artifacts and the creation of exhibit spaces that enhance the educational value of the museum.
- Innovation: Architectural design can also be used to create unique and innovative museum designs that provide a memorable experience for visitors. Innovative designs can help the museum stand out in a crowded field of cultural institutions, encouraging repeat visitors and generating positive publicity.

Overall, architectural design is critical to the success of a museum. It impacts the functionality, aesthetics, sustainability, historical and cultural significance, and innovation of the museum design. Through careful consideration of architectural design principles, museum designers can create a space that effectively showcases collections, engages visitors, and promotes a sense of wonder and exploration.

2.8 How Would Architectural Design Quality Indicator Help In Designing Museums

Design quality indicators are important in designing museums for several reasons:

- Meeting the needs of visitors: Museums are designed to educate, entertain and engage visitors. Design quality indicators help designers ensure that the museum design meets the needs and expectations of visitors. By using design quality indicators, designers can create a museum that is functional, easy to navigate, aesthetically pleasing, and safe for visitors.
- Exhibiting collections effectively: Museums are designed to display collections of artifacts, artworks, and other objects of cultural or historical significance. Design quality indicators help designers create exhibit spaces that showcase these collections in a way that is engaging and informative for visitors.

By using design quality indicators, designers can create exhibits that are well-lit, easy to see, and effectively arranged.

- Promoting sustainability: Museums are often large buildings that consume significant amounts of energy and resources. Design quality indicators help designers create sustainable museum designs that reduce the environmental impact of the building. By using design quality indicators, designers can create a museum that is energy-efficient, uses sustainable materials, and reduces waste.
- Enhancing the museum experience: Museums are designed to provide a unique and memorable experience for visitors. Design quality indicators help designers create museum designs that are innovative, creative, and original. By using design quality indicators, designers can create a museum that is distinctive, memorable, and engaging for visitors.

Overall, design quality indicators are important in designing museums because they ensure that the museum design meets the needs and expectations of visitors, effectively showcases collections, promotes sustainability, and enhances the museum experience.

2.9 Indian Codes And Bye Laws

2.9.1 National Building Code of India (BIS 2016)

As buildings in India became more complex, the need for a unified building code became apparent. There has been a plethora of large-scale changes in building construction activities, such as a shift in the nature of occupancies with the prevalence of high rises and mixed occupancies, a greater reliance on and complexity of building services, the development of new/innovative construction materials and technologies, a greater need for environmental preservation, and recognition of the need for planned management of existing buildings and the built environment. A comprehensive revision has thus been issued to address all of these issues and to reflect changes incorporated in various standards that are heavily used in the Code.

Part 3 of NBC, 2016 talks about the Development Control Rules and General Building Requirements. It provides guidelines for the following:

- Land use classification
- Means of access
- Community open space and amenities
- Open space within a plot
- Area and height limitations
- Off-street parking space
- Green belt, landscaping, and water conservation
- Requirements related to different parts of the buildings
- Requirements for accessibility in the built environment for the elderly and specially-abled person
- Fire and life safety
- Design and construction
- Lighting and ventilation
- Electrical and allied installation
- Air conditioning, heating, and mechanical ventilation
- Acoustic, sound insulation, and noise control
- Heat insulation
- Installation of lift, escalator, and moving walks

- Information and communication-oriented installation
- Plumbing services including solid waste management
- Sustainability
- Asset management

GUIDELINES FOR MUSEUMS/GALLERIES GIVEN IN NBC

Quiet conditions for reading and study are essential in libraries, museums, and art galleries. To reduce noise, stack rooms, store rooms, and administrative offices should be planned to screen reading rooms, print rooms, and lecture rooms from noise sources. Ceilings should be treated flat and floor finishes should be resilient. In existing buildings, rubber linoleum or vinyl asbestos tiles laid over the floor in traffic areas are often a solution.

2.9.2 LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

The Leadership in Energy and Environmental Design (LEED) guidelines provide a framework for designing and constructing environmentally sustainable buildings. While there isn't a specific set of LEED guidelines exclusively for museums, museums can pursue LEED certification by following the guidelines established for the specific building type in which they fall.

Museums typically fall under the "Commercial Interiors" or "New Construction" categories of LEED, depending on whether the museum is a new building or a renovation project. The specific LEED rating system that applies will depend on the project's scope, size, and goals.

LEED certification is based on a point system, and the number of points earned determines the level of certification: Certified, Silver, Gold, or Platinum. Here are some general areas that museums can focus on to achieve LEED certification:

- Sustainable Site Selection: Choose a site that minimizes environmental impact, promotes access to public transportation, and preserves open spaces.
- Water Efficiency: Implement measures to reduce water consumption, such as using water-efficient fixtures and systems, and utilizing rainwater harvesting and greywater recycling techniques.
- Energy Efficiency: Design and incorporate energy-efficient systems and equipment, such as efficient HVAC systems, lighting controls, and renewable energy sources like solar panels.
- Materials and Resources: Select environmentally friendly materials, promote recycling and waste reduction during construction, and use sustainable building products with low environmental impact.
- Indoor Environmental Quality: Ensure high indoor air quality through proper ventilation, the use of low-emitting materials, and effective pollutant control. Provide ample natural lighting and views of the outdoors.
- Innovation and Design Process: Implement innovative strategies and design approaches that go beyond standard LEED requirements to further enhance sustainability.

It's important to note that these are general guidelines, and specific requirements may vary depending on the LEED rating system being pursued and the unique characteristics of the museum project. To achieve LEED certification, project teams must follow the specific requirements outlined in the LEED rating system they choose and earn a minimum number of points to meet the certification threshold.

2.9.3 GREEN RATING FOR INTEGRATED HABITAT ASSESSMENT (GRIHA)

GRIHA, which stands for Green Rating for Integrated Habitat Assessment, is an Indian green building rating system similar to LEED. GRIHA provides guidelines and criteria for evaluating the environmental performance of buildings in India. While there isn't a specific set of GRIHA guidelines exclusively for museums, museums can strive to incorporate sustainable practices and meet the GRIHA criteria for the relevant building type.

Museums typically fall under the "Non-residential Building" category in GRIHA. Here are some general areas that museums can focus on to align with GRIHA guidelines:

- Sustainable Site Planning and Design: Select a site that minimizes environmental impact, encourage access to public transportation, and preserves existing vegetation. Incorporate landscape design that promotes biodiversity.
- Water Conservation: Implement strategies to reduce water consumption, such as using water-efficient fixtures, rainwater harvesting, and greywater recycling.
- Energy Efficiency: Design the building envelope to minimize heat gain or loss, incorporate energy-efficient lighting systems, and utilize energy-efficient equipment and appliances. Consider renewable energy sources such as solar panels.
- Materials and Resources: Select environmentally friendly and locally sourced materials, promote recycling and waste reduction during construction, and use sustainable building products with low environmental impact.
- Indoor Environmental Quality: Ensure good indoor air quality through proper ventilation, use low-emitting materials, and provide adequate natural lighting and views of the outdoors. Design spaces that prioritize occupant comfort.
- Solid Waste Management: Implement waste segregation systems, promote recycling and composting, and minimize waste generation during construction and operation.
- Sustainable Transport: Encourage the use of public transportation, provide bicycle parking facilities, and promote carpooling and electric vehicle charging infrastructure.
- Life Cycle Assessment: Consider the life cycle impacts of the building, including construction, operation, and end-of-life considerations.

These are general areas to focus on, and specific requirements may vary depending on the project's scope and the version of GRIHA being pursued. It's important to refer to the specific GRIHA rating system and its guidelines for detailed requirements and criteria.

2.10 CASE STUDIES

2.10.1 Parliament Hill School

Parliament Hill School is located in London's Highgate neighborhood. The school utilized the DQI as part of a "trailblazer" initiative and found them valuable consultation tools.

The new building provides the school with additional facilities.

The initial phase of the undertaking consists of a new building with three design technology studios, a machine section and storage, and a student services section integrated with the school's primary entry and security system.

Along the length of the new facility, a new covered walkway serves as the school's primary external route. Under the pavilion, the south-facing windows of the design and technology studios create a successful interaction between the interior and exterior. Six roof lights clad in wood protrude from the sedum roof.

The building is served by a combination of natural and assisted ventilation with heat recovery and has a high thermal mass.

The new design and technology facilities have freed up classrooms in the existing school building, which will be renovated into comfortable, spacious general teaching spaces. Currently, a second building for drama and media studies is being constructed.

DQI SUGGESTIONS INCORPORATED

1. FUNCTIONALITY - ACCESS

The singular covered walkway, which serves as a unifying, fully accessible element between the school's mixed-age buildings, has been utilized to streamline student movement.

2. FUNCTIONALITY - USES

The new building structure permits the internal accommodations to be adaptable to changing curriculum requirements in the future. The absence of internal columns allows for flexibility in wall configuration and space division.

3. BUILD QUALITY - PERFORMANCE

The design and technology laboratories have an uncluttered, industrial feel due to a limited palette of durable materials. Painted blockwork walls, exposed concrete soffits, and industrial floors provide surfaces that are durable and simple to maintain.

4. IMPACT - WITHIN THE SCHOOL

- Care has been taken to assure the building's acoustic performance. Each studio is equipped with acoustic absorption thanks to the inventive use of baffles supported by concrete soffits.
- The demand for large, adaptable, square studios has resulted in a building with a comparatively deep floor plan. Windows and roof lights shaped like chimneys provide the necessary natural illumination.

2.10.2 Walsall Heritage Centre

Walsall Council intends to consolidate the Council's heritage assets, which could involve merging the various services of various Museums and Centres into a singular Heritage Centre. This proposed development offers a unique opportunity to consolidate a number of offices and community resources under one roof.

The primary function of the Local History Centre is to provide the Borough of Walsall with an archives and local studies service and to gather records relating to the history of Walsall. The Museum is a public gallery with a permanent display of the social and industrial history of the Borough, derived from the Council's collections.

The Leather Museum is a renowned working museum located adjacent to the town's ring road on the outskirts of the city center. The museum is housed in a restored 1891 leather factory. It opened as a museum in 1988 with the mission of being a working museum where visitors can observe and participate in the production of leather products.

The Walsall Heritage Centre could offer a holistic experience by bringing together diverse collections, documents, and artifacts in one location and making all of the Borough's heritage assets accessible to the public in inventive ways.

Design Quality Indicator (DQI) was utilized as the method for assessing and enhancing the design and construction of new buildings and the renovation of existing structures. The briefing, which included an assessment of extant facility DQI, centered on actively involving a larger group of stakeholders than is

typical in the design of buildings. It involves not only the design team and builders, but also all those who will use, finance, or be affected by the building.

During the existing building assessments, participants discussed the functionality and performance of the existing structures, as well as their preferences.

At the Briefing stage workshop, the project's stakeholders discussed and agreed upon their goals. In the form of a Briefing Record, the DQI Facilitator recorded the group's consensus regarding the project's objectives. This document contributes to the project design brief and serves as a benchmark against which subsequent DQI Stage seminars evaluate the design.

Important issues such as accessibility to the building and public transport, the use and circulation of space, and the enhancement of activities by regular Centre users were discussed.

2.10.3 THE ULSTER MUSEUM

The Ulster Museum, located in Belfast's Botanic Gardens, has approximately 8,000 square meters of public display space, showcasing collections of fine and applied art, archaeology, ethnography, Spanish Armada treasures, local history, numismatics, industrial archaeology, botany, zoology, and geology. The museum is the greatest in Northern Ireland.

Due to renovations, the Ulster Museum was closed for nearly three years (2006 to October 2009). The primary goals of the renovation were to increase accessibility and public visibility, modernise the Educational, Learning Environments and public comfort facilities, and reinterpret the Science and History Collections.

On its 80th anniversary in 2009, the Ulster Museum reopened to the public. A new "hall of wonder" and orientation atrium comprised the core of the new design. The renovations were funded by the National Lottery and the Department of Culture, Arts, and Leisure of the Northern Ireland Executive.

As a result of DQI evaluations, several modifications were made to the design. For instance, local specialists recommended incorporating a distinct room where children could hang their coats and bags and consume their packed lunches. This chamber could also serve as a classroom.

2.11 Consolidation Of Design Quality Indicators

A total of 32 indicators were consolidated from an extensive literature survey and brainstorming on design quality applied to different types of buildings. They are grouped into three major heads of Design Quality Indicator, namely the Functionality aspect, Build quality aspect, and Impact aspect.

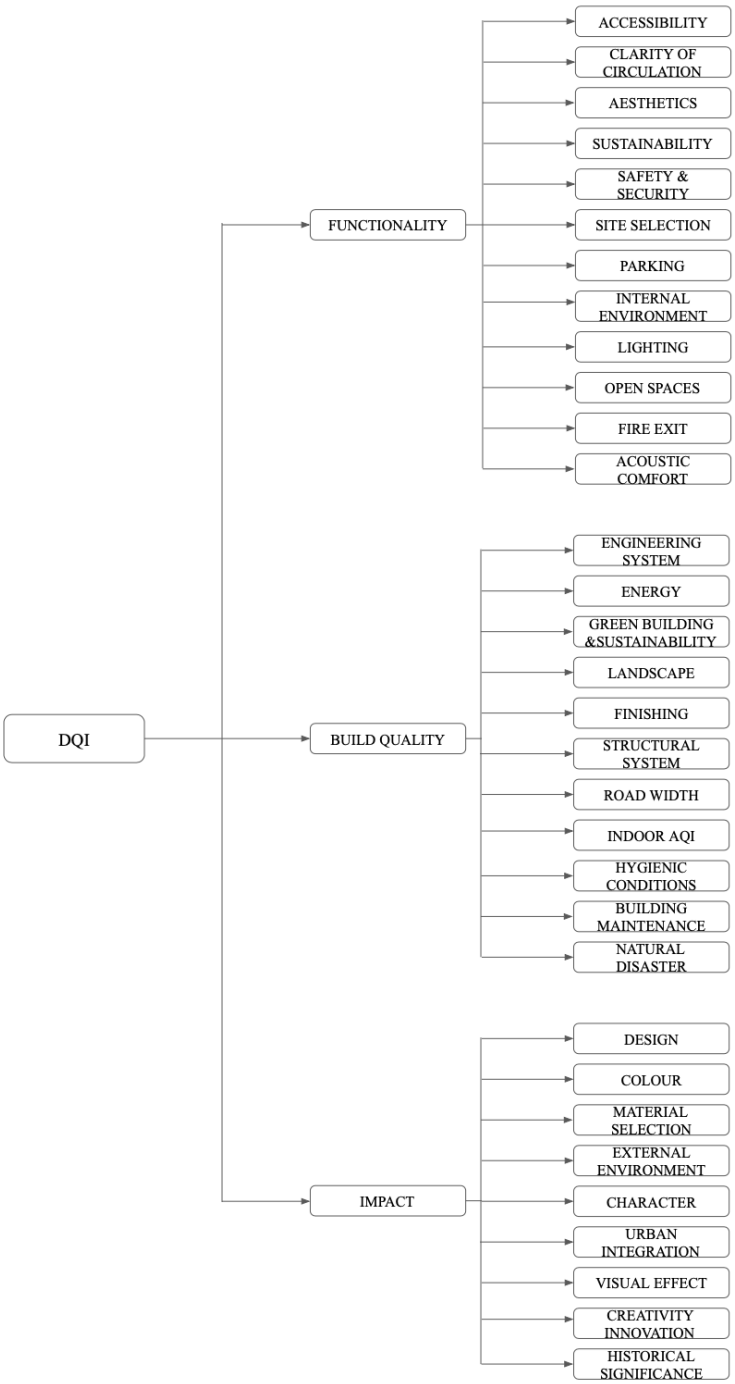

Figure 4. DQI's identified categorised according to Functionality, Build Quality, and Impact

Table I: Functionality-Based Design Quality Indicators

INDICATORS	DESCRIPTION
Accessibility	The museum design should be accessible to all visitors, regardless of their physical abilities. This includes ramps, elevators, and other features that allow visitors to navigate the space easily.

Clarity of Circulation	The museum's spatial organization should be designed to facilitate movement and create a logical flow of visitors throughout the space. This includes elements such as entryways, corridors, and exhibit spaces.
Aesthetics	The design should be visually appealing and reflect the values and identity of the building's occupants.
Sustainability	Architectural design can also help promote sustainability in museum design. Sustainable architectural practices can help reduce the environmental impact of the museum and promote sustainable practices within the community.
Safety & Security	The museum design should prioritize the safety and security of visitors, staff, and collections. This includes fire safety features, emergency exits, and security measures to protect the exhibits.
Site Selection	The site selection and orientation should be carefully considered to take advantage of natural light, views, and environmental conditions. The design should also be integrated into the surrounding landscape and community.
Parking	Provided with adequate cycle, two-wheeler, and four-wheeler parking
Internal Environment	The atmosphere in the building, the relation between light and space, and the working climate
Lighting	The lighting is efficient and allows for different user requirements
Open Spaces	Appropriate for the breeze, sunlight, and outdoor activities
Fire Exit	The building is provided with adequate fire exits as per norms
Acoustic Comfort	The building provides acoustic comfort to the users

Table II: Build Quality-Based Design Quality Indicators

INDICATORS	**DESCRIPTION**
Engineering System	MEP systems should be working properly
Energy	The building is efficient in the use of energy

Green Building & Sustainability	The building uses green energy
Landscape	The attractive landscape of the building
Finishing	Finishing of the building is durable and suitable
Structural System	The structure is efficient and there are no hindrances in the experience of the building because of the structural system.
Road Width	Suitable for pedestrian as well as vehicular
Indoor Air Quality	Free from smoke, CO, etc.
Hygenic Condition	Proper drinking water and toilet facilities
Building Maintenance	The building is maintained properly
Natural Disaster	The buildings should be able to survive natural disasters like floods or others

Table III: Impact Quality-Based Design Quality Indicators

INDICATORS	**DESCRIPTION**
Design	Visual Quality of the building with respect to the context.
Color	Suitable for the building exterior.
Material Selection	Materials should be selected on the basis of their Strength, Durability, Cost, and Local availability.
External Environment	Conducive for Mobility and Activity.
Character	The impact of buildings on character, thinking, and human behavior.
Urban Integration	Interaction with Private and public areas and the Impact of Buildings on the City and Community
Visual Effect	The design of the building is not too distracting, the building acts as a backdrop.
Creativity & Innovation	Museum design incorporates innovative and creative elements that set the museum apart from other cultural institutions. This may include interactive exhibits, immersive technology, or other innovative design features.

Historical and Cultural Significance	Architectural design is essential in preserving the historical and cultural significance of the museum. The design must consider the preservation of historical and cultural artifacts and the creation of exhibit spaces that enhance the educational value of the museum.

CHAPTER III: RESEARCH DESIGN

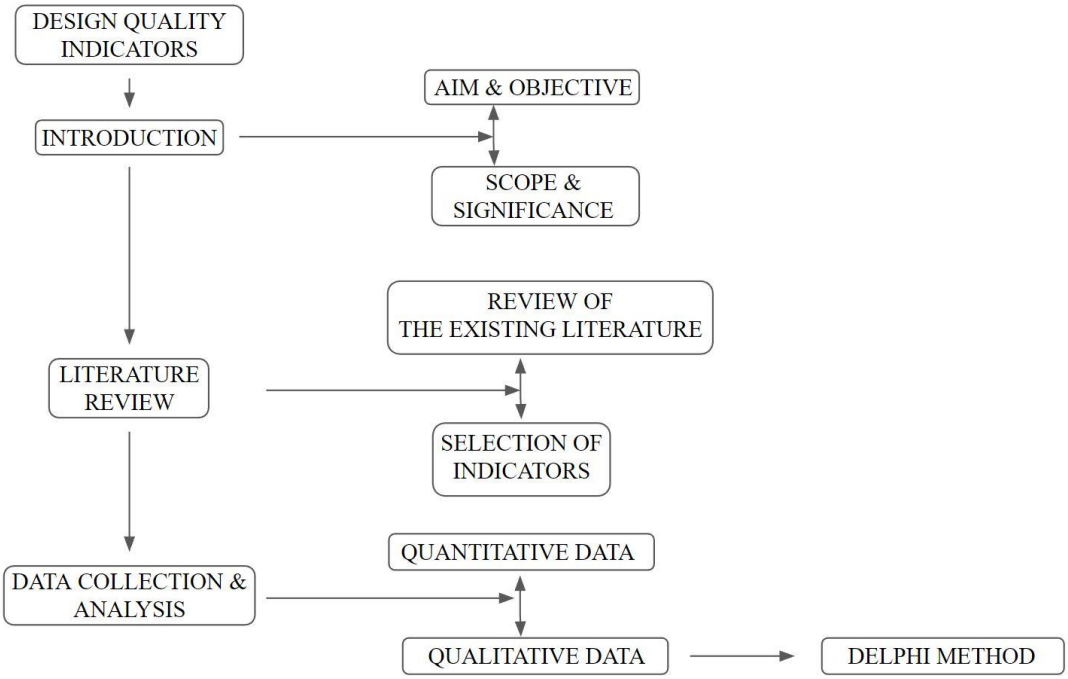

Fig 3'. Methodology flow chart

3.1 Review of the Existing Literature

The methodology for this study was developed based on a comprehensive review of the existing literature on the topic. The literature review aimed to identify relevant theories, concepts, and methodologies used in previous studies related to design quality indicators. The review encompassed a range of scholarly articles, books, and reports, sourced from reputable databases and academic libraries.

The findings from the literature review guided the selection of appropriate design quality indicators for this study. However, due to the specific objectives of this research, adaptations and modifications were made to tailor the design quality indicators to the unique requirements of the museum setting.

3.2 Sample Selection

The data collection sample selection is determined by the specific context of the Design Quality Indicators. It involves both demand-side and supply-side stakeholders. On the supply side, twelve prominent architects were interviewed, as well as twenty visitors and five curators of the Pradhan Mantri Museum in Delhi from the supply side.

3.3 Data Collection

The methodology employed for this study combines qualitative and quantitative approaches. In order to get feedback on the importance of design quality indicators that are grouped under functionality, build quality, and impact in the context of Museums and galleries, a questionnaire was developed.

3.3.1 Qualitative Data:

- The qualitative data collection involved conducting online interviews with practicing architects using the Delphi method.
- The Delphi method is a qualitative research approach that seeks to gather expert opinions and reach a consensus on a specific topic.

3.3.2 Quantitative Data:

- The quantitative data collection involved interviews with visitors and curators of The Pradhan Mantri Museum in Delhi
- A structured questionnaire with closed-ended questions was used to gather quantitative data. The questionnaire aimed to obtain ratings from participants on the importance of DQI related to functionality, build quality, and impact.

3.4 Data Analysis

To gather input on the indicators, a five-point Likert scale with options ranging from "1 = Not Significant" to "5 = Very Significant" has been used (table 4). Average index (AI) analysis was performed to establish the indicators' level of importance, and the results are interpreted as follows:

AI Range Value	Interpretation
4 - 5	Very Significant
3 - 4	Significant
2 - 3	Moderately Significant
1 - 2	Less Significant
0 - 1	Not Significant

Table 4. Average index value and interpretation

3.5 Ethical Considerations

Throughout the research process, ethical considerations are given utmost importance. Informed consent is obtained from participants before their involvement in interviews and surveys. Anonymity and confidentiality of participants' responses are ensured, and their privacy is protected. The research complies with ethical guidelines and regulations regarding data collection, storage, and analysis.

CHAPTER IV: RESULTS AND FINDINGS

4.1 Perception Of Design Quality Markers

4.1.1 Perception Of Architects

I) Functionality Perception

Fire Exit aspect received the highest functionality index (4.83), followed by parking (4.75) and Accessibility (4.66), as shown in Figure 3. While Acoustic comfort, Open spaces, and Aesthetics have received much less attention.

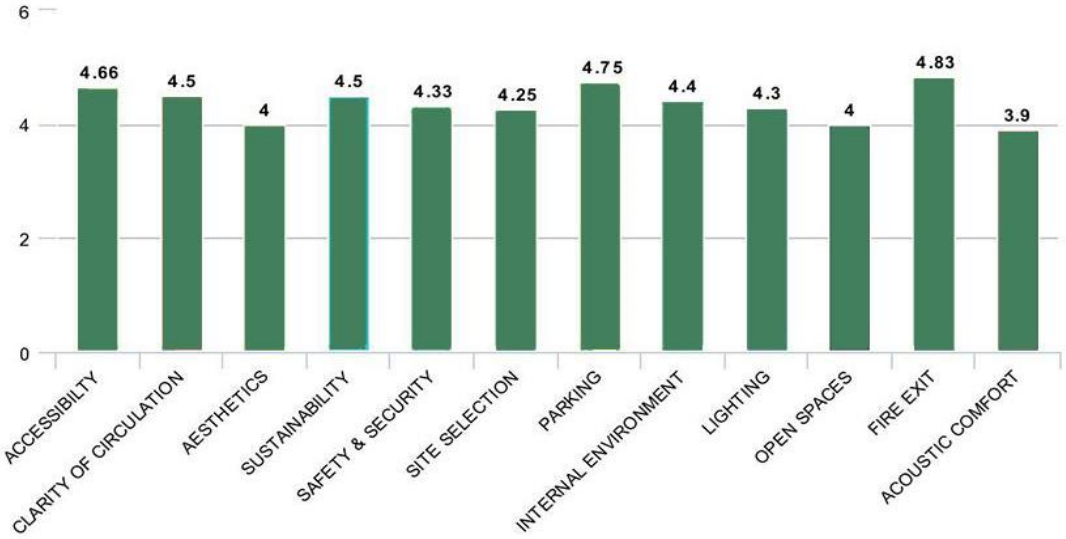

Figure 5. DQI Index for functionality aspect

II) Perception Of Build Quality

Hygienic Conditions received the highest score of 4.83 in the build quality category, followed by Structural System and Indoor AQI (4.75), according to Figure 4. Road width and the landscape have a rating of 4, making them the least significant factors.

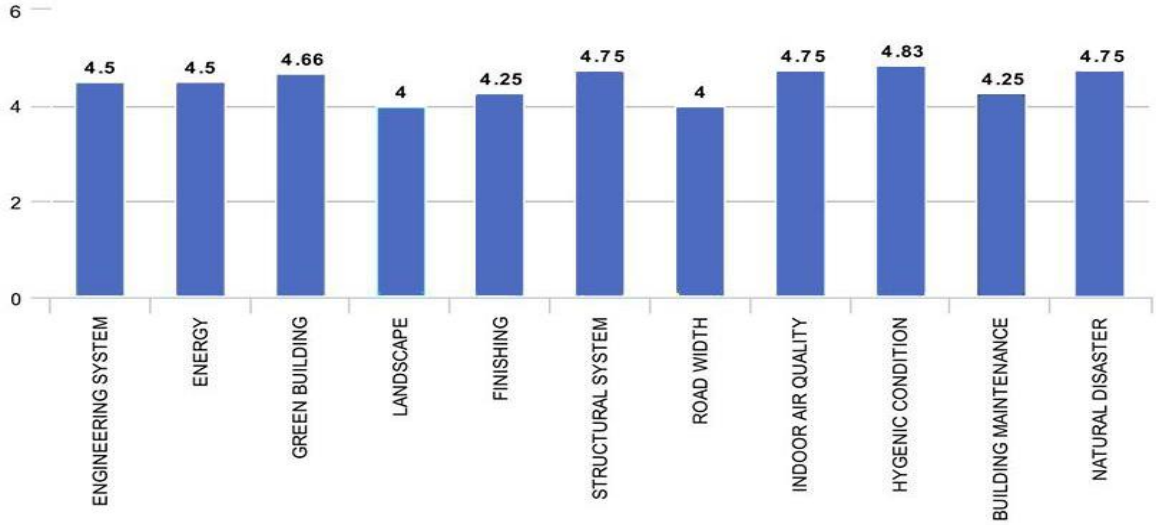

Figure 6. DQI Index for Build Quality aspect

III) Perception of Impact

Figure 5 shows that among the impact indicators, material selection and historical and cultural significance have the highest scores of (4.6) and 4.4 respectively, while color and visual effect receive lower scores and are therefore merely statistically significant.

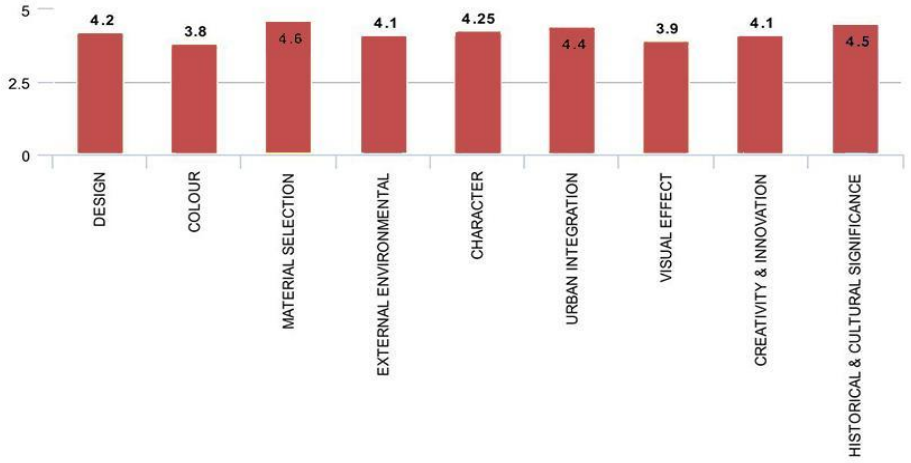

Figure 7. DQI Index for impact

4.1.1 Perception Of Visitors

I) Functionality Perception

The lighting aspect received the highest functionality index (4.75), followed by Clarity of circulation (4.41), as shown in Figure 6. While Site selection and Sustainability have received much less attention.

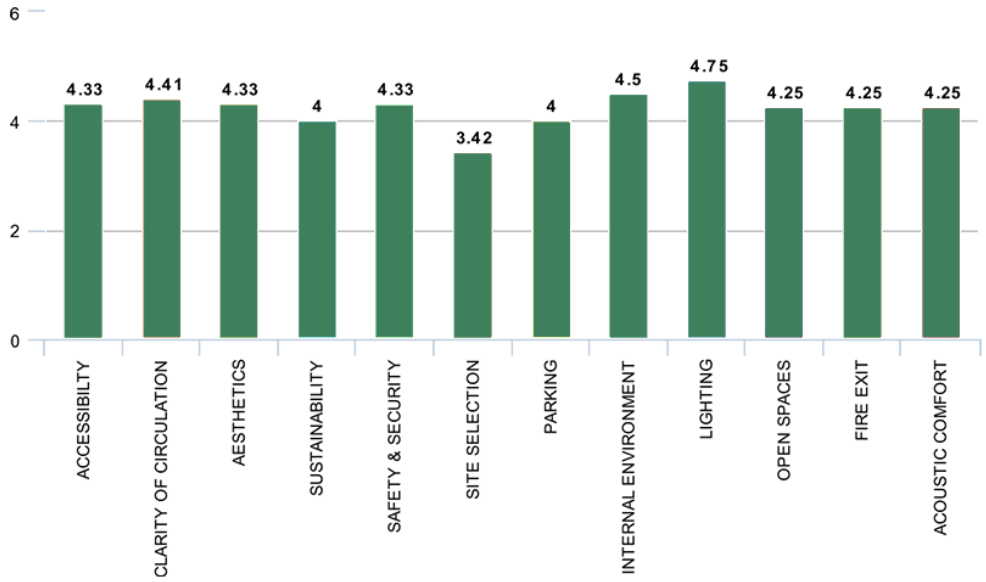

Figure 8. DQI Index for functionality aspect

II) Perception Of Build Quality

Structural System received the highest score of 4.75 in the build quality category, followed by Finishing (4.66) and Energy (4.58), according to Figure 7. Road width and the Natural disaster have a rating of 4, making them the least significant factors.

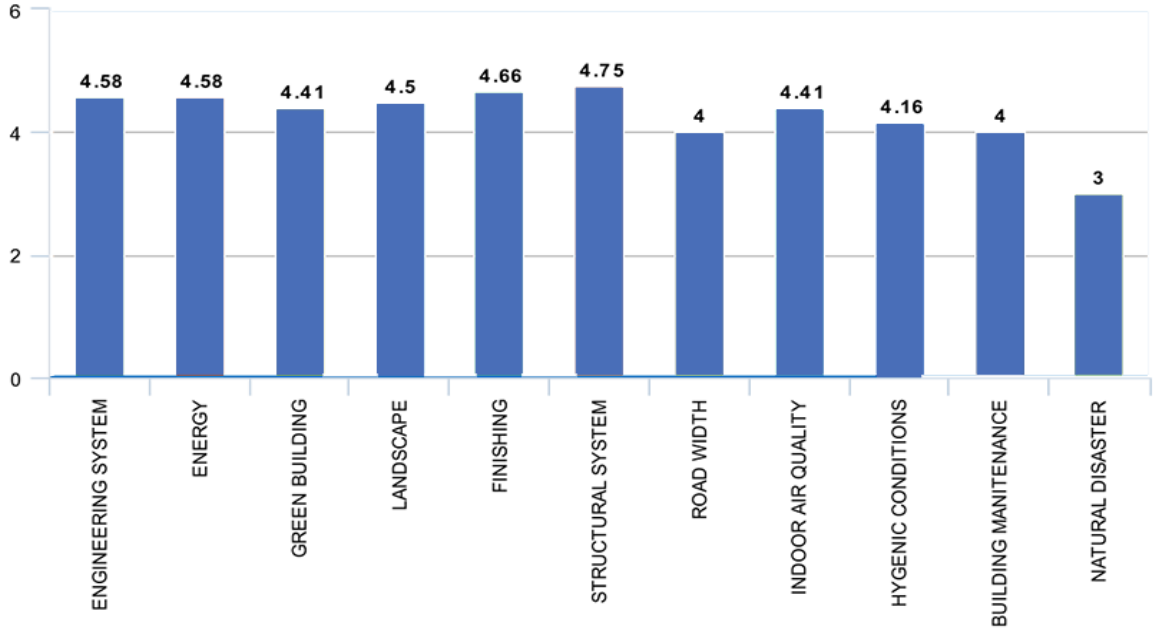

Figure 9. DQI Index for Build Quality aspect

III) Perception of Impact

Figure 8 shows that among the impact indicators, Urban integration and Character have the highest scores of 4.75 and 4.66 respectively, while Historical & Cultural Significance and visual effect received lower scores and are therefore merely statistically significant.

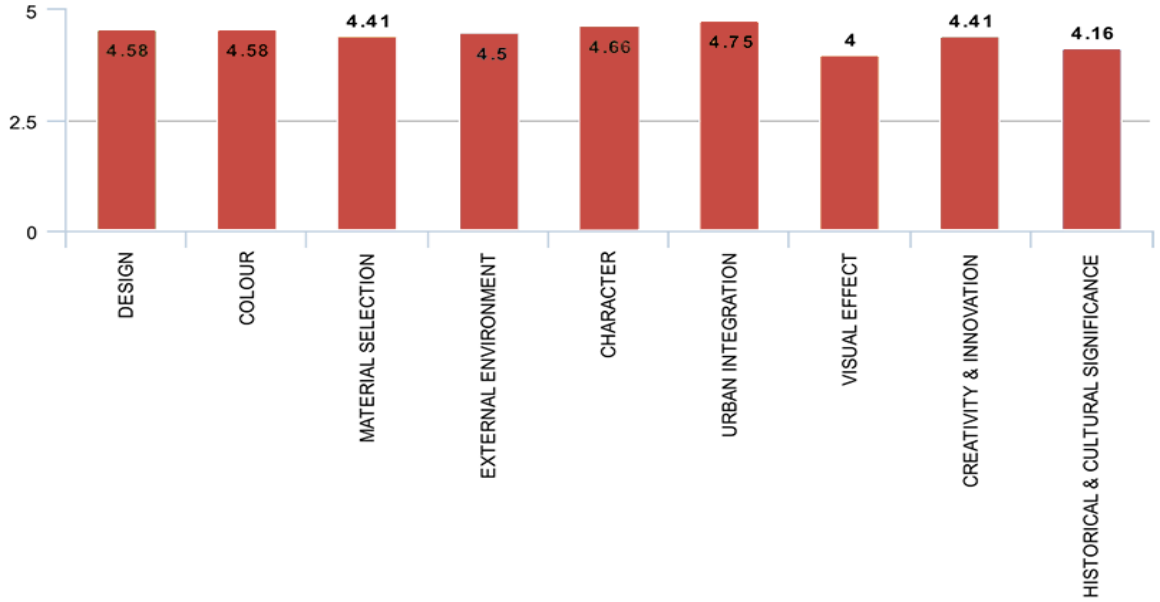

Figure 10. DQI Index for impact

4.1.1 Perception Of Curators

I) Functionality Perception

Internal environment received the highest functionality index (4.8), followed by lighting and Acoustic comfort (4.6), as shown in Figure 9. While Parking, Site selection, and Clarity of circulation have received much less attention.

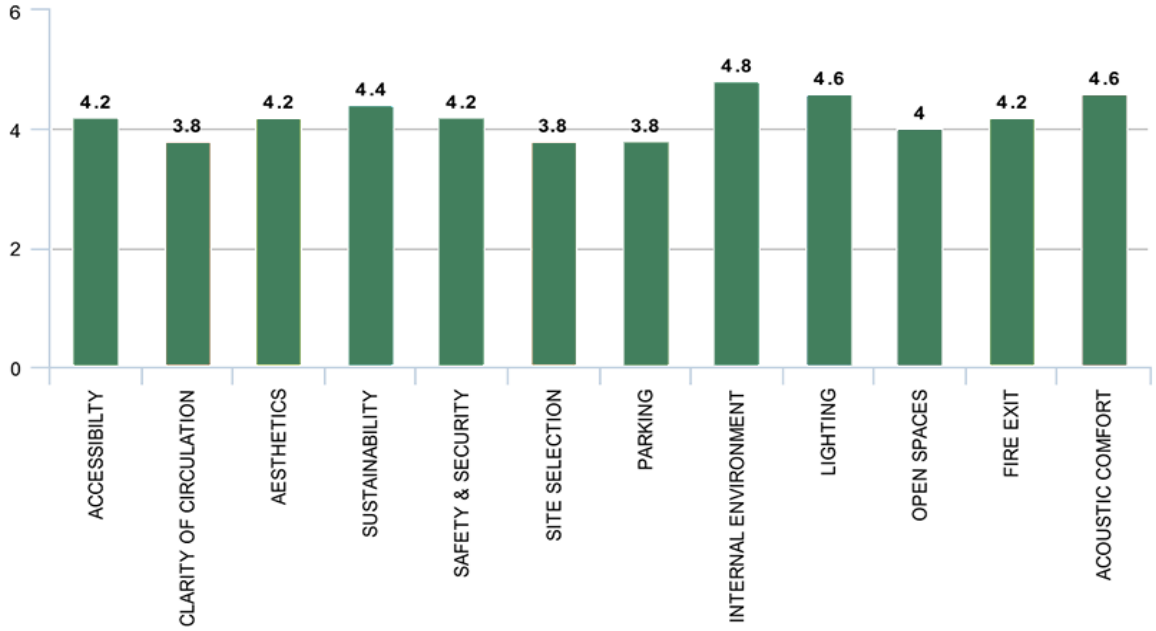

Figure 11. DQI Index for functionality aspect

II) Perception Of Build Quality

Structural System, Indoor air quality and hygienic conditions received the highest score of 4.6 in the build quality category, Landscape, and Road width have a rating of 3.8, making them the least significant factors.

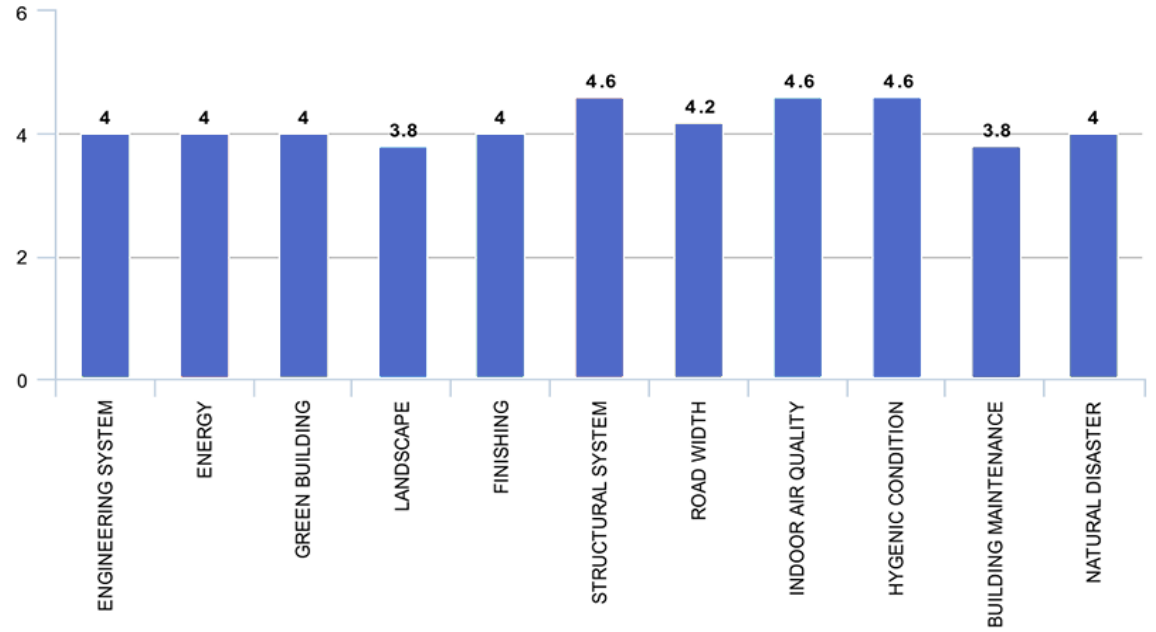

Figure 12. DQI Index for Build Quality aspect

III) Perception of Impact

Figure 11 shows that among the impact indicators, Creativity and Character have the highest scores of (4.6) and 4.4 respectively. At the same time, Material selection and Urban integration receive lower scores and are therefore merely statistically significant.

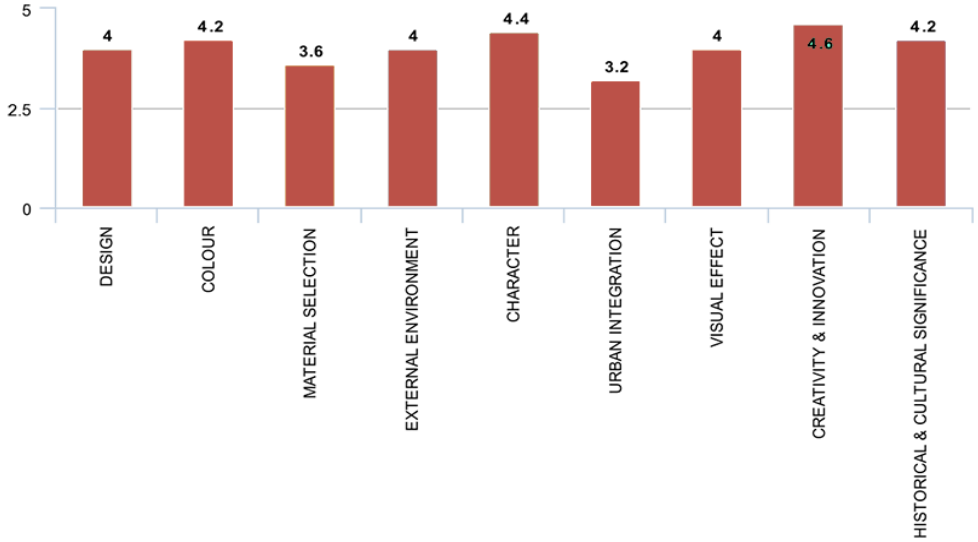

Figure 13. DQI Index for impact

CHAPTER V: ANALYSIS

5.1 Comparison Between Architects, Visitors, And Curators

5.1.1. Functionality Aspect

The range of AI scores for the indicators, according to architects, is between 4.83 and 3.9.
The range of visitor-reported AI scores for the indicators is between 4.75 and 3.
The range of AI scores for the indicators, according to the curators, is between 4.8 and 3.8.
According to architects, the most significant DQI was the Fire Exit, while for visitors it was the lighting and for curators, it was the interior environment.
Internal Environment, Sustainability, and Safety have received superior ratings from each of the three targeted categories.

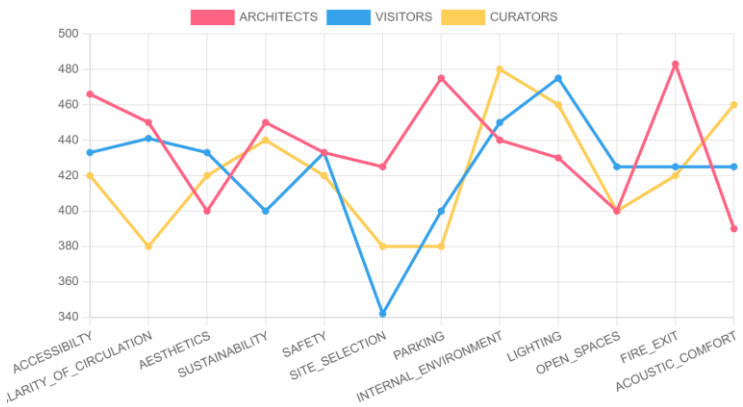

Figure 14. DQI Index For Functionality Among Various Groups

5.1.2. Build Quality Aspect

The range of AI scores for the indicators, according to architects, is between 4.83 and 4
The range of AI scores for the indicators, according to visitors, is between 4.75 and 3
The range of AI scores for the indicators, according to curators, is between 4.6 and 3.8
The most important DQI according to architects was Hygenic conditions, whereas for visitors it was Structural system and for curators, it was the internal structural system, hygienic conditions, and Indoor air quality.
Structural systems have received relatively higher scores from all three of the targeted groups.

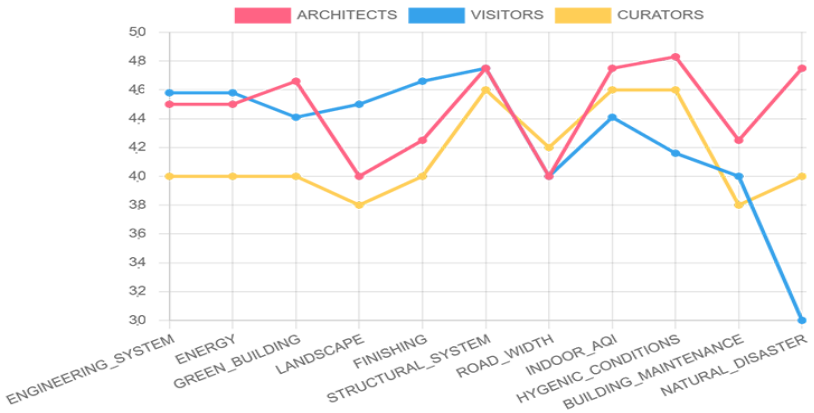

Figure 15. DQI Index For Build Quality Among Various Groups

5.1.3. Impact Aspect

The range of AI scores for the indicators, according to architects, is between 4.6 and 3.8
The range of AI scores for the indicators, according to visitors, is between 4.75 and 4
The range of AI scores for the indicators, according to curators, is between 4.4 and 3.2

According to architects, the most significant DQI was the Material Selection, while for visitors it was the Urban Integration and for curators, it was creativity & innovation.
Design and historical significance have received superior ratings from each of the three targeted categories.

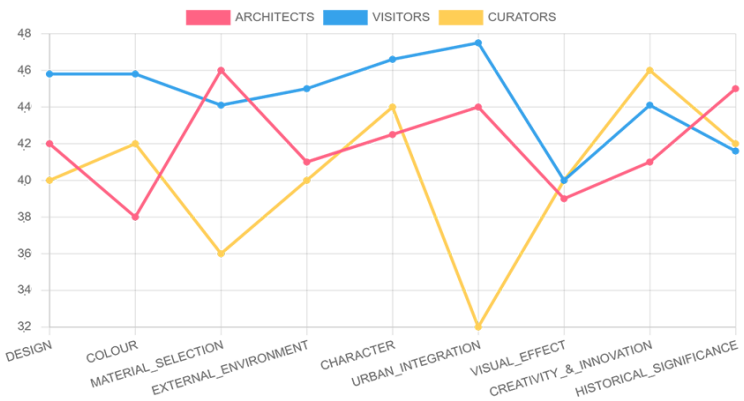

Figure 16. DQI Index For Impact Among Various Groups

CONCLUSION

The quality of architectural design is essential for the success of building projects, including museums. It contributes to customer satisfaction, enhances the user experience, and builds trust and credibility. Tools like the Design Quality Indicator (DQI) have been developed to assess and monitor design quality throughout the project's life cycle. A well-designed museum must effectively house and exhibit collections, engage visitors, promote sustainability, preserve cultural heritage, and provide a unique and memorable experience. In India, the National Building Code of India (NBC) and the Leadership in Energy and Environmental Design (LEED) guidelines offer a framework for designing environmentally sustainable buildings. By prioritizing functionality, aesthetics, sustainability, historical significance, and innovation, designers can create museums that not only meet the needs and expectations of visitors but also contribute to the enrichment of society and the preservation of cultural heritage.

On the basis of a literature review and brainstorming sessions, this study compiled 32 indicators (classified into three design quality fields) to measure customer satisfaction with regard to the design quality of buildings. The research aimed to assess the perception of design quality markers among architects, visitors, and curators. The findings from the study shed light on their varying perspectives and provide valuable insights into the factors they prioritize in assessing design quality. In terms of functionality perception, the Fire Exit aspect was rated highest by architects, while lighting received the highest rating from visitors and the internal environment was most significant for curators. In terms of build quality perception, Hygienic Conditions ranked highest for architects, Structural Systems for visitors, and a combination of internal structural systems, hygienic conditions, and indoor air quality for curators. When considering the impact aspect, Material Selection was deemed most significant by architects, Urban Integration by visitors, and creativity & innovation by curators.

The study provides valuable insights for design practice and decision-making processes, emphasizing the importance of considering multiple stakeholders' perspectives in design processes to ensure a comprehensive evaluation of design quality. Overall, this research contributes to the field of design quality assessment by highlighting the varying perspectives of architects, visitors, and curators.

FUTURE SCOPE

Future research could expand the sample and include additional stakeholder groups to further enrich the understanding of design quality perception, similarly, this method can be used for other building typologies as well

CHAPTER VI: REFERENCES

1. Giddings, B., Sharma, M., Jones, P. & Jensen, P. (2013). An evaluation tool for design quality: PFI sheltered housing, Building Research, and Information, 41 (6). pp. 690-705. ISSN 0961-3218, Taylor & Francis
2. Whyte, J. K., Gann D. M, & Salter, A. J. (2003). Indications Of Design Quality: User Input And The Development Of The Design Quality Indicator Toolkit, Innovation Studies Centre, The Business School, Imperial College London,
3. Whyte, J. K., Gann D. M, & Salter, A. J. (2003). Design Quality Indicator as a tool for thinking, Spon Press, Building Research & Information, September–October, 318–333

4. Tanushree Das, Architectural Design Quality Indicators for Educational Built Environment in the Indian Context, International Journal of Applied Engineering Research ISSN 0973-4562 Volume 17, Number 1 (2022) pp. 66-73 © Research India Publications.
5. Dina Marie V. Zemke & Madeleine Pullman (2008) Assessing the value of good design in hotels, Building Research & Information, 36:6, 543-556
6. Sunand Prasad (2004) Clarifying intentions: the design quality indicator, Building Research & Information, 32:6, 548-551
7. Rizwan U. Farooqui, Syed M. Ahmed, Designing for Quality: An Empirical Study of Design Quality Indicator (DQI) Tool, Seventh LACCEI Latin American and Caribbean Conference for Engineering and Technology (LACCEI'2009) "Energy and Technology for the Americas: Education, Innovation, Technology, and Practice"
8. Azeanita Suratkon1 and Safuan Jusoh2, Indicators To Measure Design Quality Of Buildings
9. Michael Keniger (2004) Achieving design quality: from intent to implementation, Building Research & Information, 32:3, 251-254, DOI: 10.1080/09613210410001679866

CHAPTER VII: ANNEXURE

QUESTIONNAIRE

1. Name of the Architecture firm you are involved with
   Ans.

2. Years of experience in your field
   Ans.

3. Accessibility
- 1
- 2
- 3
- 4
- 5

4. Clarity of Circulation
- 1
- 2
- 3
- 4
- 5

5. Aesthetics
- 1
- 2
- 3
- 4
- 5

6. Sustainability
- 1
- 2
- 3
- 4
- 5

7. Safety & Security
- 1
- 2
- 3
- 4
- 5

8. Site Selection
- 1
- 2
- 3
- 4
- 5

9. Parking
- 1
- 2
- 3
- 4
- 5

10. Internal Environment
- 1
- 2
- 3
- 4
- 5

11. Lighting
- 1
- 2
- 3
- 4
- 5

12. Open Spaces

- 1
- 2
- 3
- 4
- 5

13. Fire Exit
- 1
- 2
- 3
- 4
- 5

14. Acoustic Comfort
- 1
- 2
- 3
- 4
- 5

15. Engineering System
- 1
- 2
- 3
- 4
- 5

16. Energy
- 1
- 2
- 3
- 4
- 5

17. Green Building & Sustainability
- 1
- 2
- 3
- 4
- 5

18. Landscape
- 1
- 2

- 3
- 4
- 5

19. Finishing
- 1
- 2
- 3
- 4
- 5

20. Structural System
- 1
- 2
- 3
- 4
- 5

21. Road Width
- 1
- 2
- 3
- 4
- 5

22. Indoor Air Quality
- 1
- 2
- 3
- 4
- 5

23. Hygienic Condition
- 1
- 2
- 3
- 4
- 5

24. Building Maintenance
- 1
- 2
- 3

- 4
- 5

25. Natural Disaster
- 1
- 2
- 3
- 4
- 5

26. Design
- 1
- 2
- 3
- 4
- 5

27. Color
- 1
- 2
- 3
- 4
- 5

28. Material Selection
- 1
- 2
- 3
- 4
- 5

29. External Environment
- 1
- 2
- 3
- 4
- 5

30. Character
- 1
- 2
- 3
- 4

- 5

31. Urban Integration
- 1
- 2
- 3
- 4
- 5

32. Visual Effect
- 1
- 2
- 3
- 4
- 5
-

33. Creativity & Innovation
- 1
- 2
- 3
- 4
- 5

34. Historical and Cultural Significance
- 1
- 2
- 3
- 4
- 5

LITERATURE MATRIX

S. No	AUTHOR	TITLE	FINDINGS	INFERENCE
1	Tanushree Das	Architectural Design Quality Indicators for Educational Built Environment in the Indian Context	This research paper conducted a pilot survey to assess the suitability of indicators in the context of the design of the educational built environment in India. It found that all indicators are	Design Quality is one of the three considerations in a project, but it is difficult to measure quality. To address this, the CIC of the UK developed the DQI toolkit, which is based on the Vitruvian principles of Functionality, Build Quality, and Impact. A total of 41 DQI were established after a literature review and a quantitative approach using a questionnaire was used to

			significant in measuring the design quality of educational buildings, with criteria like use, access, delighting, indoor air quality, hygienic condition, security systems, and comfort being the most significant. The DQI tool can be used in different stages of the project lifecycle, such as briefing, design development, construction, and post-occupancy.	collect data. Fire exists had the highest AI, followed by use and access, in the build quality aspect, stability and hygienic condition, structural element, and security system scored the highest AI. Among the impact indicators, comfort and natural disaster received the highest score, while colour and visual effect received the lowest AIs. It is important to note that the maximum indicators of functional aspects range from 4.5 to 5 AI, while most indicators of impact range from 3.5 to 4.5 AI.
2	Azeanita Suratkon and Safuan Jusoh	Indicators To Measure Design Quality Indicators Of Building	Indicators for measuring design quality that has been adopted in the UK DQI can be used in the Malaysian AEC industry with some modifications. This study identified indicators to measure satisfaction with building design quality and assess the indicators' suitability in Malaysia's AEC industry. The survey found that all the found indicators were significant in measuring the design quality of buildings in the Malaysian AEC industry.	Quality, along with time and cost, is one of the three constraints or forces that govern every construction project. The quality of design will determine the suitability of buildings, as well as the quality of compliance. The DQI was created to assess the quality of the design of buildings based on feedback and perceptions of individuals with an interest or connection to the product. It takes the form of a questionnaire and examines three quality indicators: functionality, build quality, and building impact. The built quality of a building is determined by its structure, fabric, finishes, fittings, engineering systems, and coordination of all of these, as well as how well they perform. The evaluation is based on the following criteria: performance, engineering, construction, character and innovation, form and materials, internal environment, and urban and

				social integration. 34 indicators were established, with AI values between 3.50 and 4.50. Natural lighting and access received the highest AI scores in terms of functionality, while easy access to users, particularly those with disabilities, had the highest AI value among the impact indicators.
3	David M.Gann, Ammon J. Salter and Jennifer K.Whyte	Design Quality Indicator as a tool for thinking	This paper describes the development of the Design Quality Inventory (DQI) concept, framework and data gathering tool, which has been adopted by the National Health Service Estates Division and the Ministry of Defence. The authors have embarked on a second phase of development, including an improved questionnaire with a Web-based interface and new ways of visualizing results. Additionally, a detailed weighting system is being developed to take into account three levels of design quality: Basic, Value-added and Excellent. This approach is hoped to lead to a more informed debate about the value of design in buildings and to complement approaches to	A new performance-measuring culture has emerged in the UK construction industry, but this method of measuring tells little about the design quality contained in the construction process's products or outputs. CIC proposed creating a new instrument for evaluating design quality and was awarded a grant. The task was to devise a way to comprehend the worth of buildings with respect to their design for various applications and to address a wide range of physical, aspirational, and emotional demands of occupiers and users. Three aspects of the development effort are taken into account: a conceptual framework, a data collection instrument, and a weighting method. The most important factor in determining the design quality of a building is whether it meets user requirements and what people think and feel about it. The Design Quality Indicator (DQI) is made up of three parts: a conceptual framework, a data collection instrument, and a weighting mechanism. It is based on the Vitruvian principles and is divided into three sections: Function, Build Quality, and Impact. The Design Quality Index (DQI) is a framework that recognizes the connections between Function,

			measuring performance in design and construction processes.	Build Quality, and Impact. It was created using a common tongue among project participants to draw consumers' attention to the variety of details indicative of superior design. The questionnaire was a short, easy-to-understand questionnaire that was intended to be utilized by anyone involved in the design or usage of buildings. There are four sections in the questionnaire: section 1 collects information about the respondent and the type of building, section 2 focuses on function, section 3 focuses on impact, section 4 explores build quality, and section 5 explores performance, engineering systems, and construction. The DQI tool weighed users' judgments of design quality in relation to the priorities they had established for the building. A formula was used to weigh the questionnaire results according to how much importance each respondent assigned to various aspects in each section of design quality. The weighting by a subsection of each design quality field was the initial component of the weighting system. Pilot studies were done to refine the instrument, but it was challenging to determine what the effects of employing the tool might be for various projects. Comparison between typologies was aimed after the first phase, and the second phase focused on reducing how much the environment affected building users. The initial pilot phase's representations were "doughnut" shaped, but they only provide weightings and scores at the section

				level, not at the level of the subsection or individual question. To illustrate findings after the initial pilot phase, a spider diagram technique was used.
4	Bob Giddings , Monika Sharma , Paul Jones and Phil Jensen	An evaluation tool for design quality: PFI sheltered housing	This paper examines the introduction of a large-scale PFI project into a metropolitan local authority in England against a background of concern about design quality. The council followed recommendations of government departments and established an appropriate organizational structure for managing the process. A new evaluation tool was developed to address this gap, and the results offered clear direction as to where the designs could be improved. However, the use of the tool did not add to the amount of time spent by the consortia on the bidding process. The CREATE Specification Tool has been examined by the Homes and Communities Agency (HCA), the UK government's national housing and regeneration agency for England, and is now	In 1999, the Labour government introduced the Commission for Architecture and the Built Environment (CABE) as its adviser on architecture. A Treasury Taskforce (2007) released its Technical Note on how to attain design quality in PFI projects. The Council decided to replace its current sheltered housing schemes with ten new constructions and sixteen renovations. The competitive conversation technique was introduced to handle relationships with bidders, and users should be consulted directly. Three design workshops were organized to incorporate design criteria into the output specification. The project team studied award-winning Plas Y Mor in Swansea as one of many design role models. The team was made aware of the value of amenity qualities and how to fully incorporate them into any design evaluation. A method for evaluating architectural design would be needed so that design alterations could be assessed in terms of their financial impact. The project and research teams created an Architectural Design Evaluation Tool for Sheltered Housing to show which bidder offered better design and improve the design quality of all the plans. Maslow (1954) suggests that each lower need must first be satisfied before addressing the next level of need. The categories identified during the

			included as an instrument setting new standards in design. Discussions have taken place with RIBA Enterprises' National Building Specification (NBS) Team about the tool, and interest has been expressed by other English local authorities. A condensed, simpler and more generic edition of the tool has been offered to MArchstudents at Northumbria University, and a medium-term objective is to identify the core of the tool as a replicable standard for different building types. Increasing attention to definition, measurement and monitoring of quality should improve the ability to create environments that continue to offer commodity, firmness and delight.	analysis of design exemplars served as the foundation for the tool's general structure, and the percentage allocation to each category (weighting within the section) was decided to reflect the extent of each strategy. The concepts of evaluation were taken from the design literature and housing research. Any improvements in design quality had to be affordable, according to government instructions.
5	Dina Marie V. Zemke and Madeleine Pullman	Assessing the value of good design in hotels	This study aimed to quantify the effect that good design has on performance to assist in business decision-making. The Design Quality Indicator	This paper examines the connections between building design and company performance in terms of earnings and market share. The built environment receives significant capital investment from the private sector, and entrepreneurs typically want proof of

			(DQI) tool provides useful insights into the guest and employee experience with their respective properties. Guests place more importance on access, space, performance, and internal environment, while employees place more on use, technical features, urban and social integration, form and materials, and build quality. Phase 2 of the study will use pre- and post-renovation results to develop a model to predict a planned renovation's effect on the property's economic and market performance.	the financial or other economic benefits of investing in anything novel or unconventional. The majority of business research on the value of design has focused on product design, but less research has been done in long-term, hedonic settings like nightclubs, casinos, stadiums, and other places where people congregate for enjoyment. Employee turnover rates in hotels are higher than in offices, schools, or hospitals, and renovation spending is driven by shifting consumer tastes, business, and technological advancements. This study identified an instrument for evaluating design quality that may be applied to a wide range of respondents, not just architectural specialists, builders, or building operations managers. The Design Quality Indicator (DQI) was chosen for this study because it may be used by all residents of the building and is not typically held by hotel staff or visitors. The authors' initial goal is to ascertain whether there are any meaningful connections between the quality of the building design and the property's performance metrics. The second objective is to modify the DQI tool to meet the objectives of the hotel industry's asset management and investment decision-making. Reliability testing was done using the pilot test data. The study found a strong positive correlation between design metrics and customer satisfaction, the ADR market index, and the RevPAR market index. However, the opinions of customers and employees about hotel design may

				not always align, as less than 25% of respondents attempted the questionnaire's section on evaluate build quality. Visitors do take note of other facets of the building's form and function, such as its factor Impact. Satisfaction with a building is influenced by its character, emotional impact, and contribution to the community. The study's statistics offer alternative perspectives on satisfaction and design evaluation, such as staff and guest satisfaction, which have a direct association with ADR and RevPAR market share penetration. Both a visual enhancement and back-of-house expenditure can increase profitability and return on investment.
6	Sunand Prasad	Clarifying intentions: the Design Quality Indicator	The Design Quality Indicator (DQI) was developed to address a cultural gap in the UK construction sector. It is composed of a conceptual framework, data-gathering tool, and 10 "subheadings" to aggregate various attributes together. The questionnaire comprises four stages that correspond to the project's briefing, mid-design, ready-for-occupation, and in-use phases. Trials of the DQI have revealed that it enables the discussion of design quality in the round. It can be improved by incorporating a	The Design Quality Indicator (DQI) was developed to address a cultural gap in the UK construction sector, with developers and builders occupying one end and architects and other designers occupying the other. The tool was subject to criticism for mixing the subjective and objective in a perplexing manner, including legitimately subjective concerns, and for not addressing how and how much the design or the future structure is to be represented to the user. It is composed of a conceptual framework, data-gathering tool, and 10 "subheadings" to aggregate various attributes together. The Design Quality Questionnaire (DQI) is a tool that allows users to assign one of three levels to each of the assertions during the briefing stage. The three levels are "Fundamental", "Added Value", and "Excellent". The questionnaire comprises four

			statement of minimum requirements and a record of the material on which the exercise was based.	stages that correspond to the project's briefing, mid-design, ready-for-occupation, and in-use phases. The tool does not take into account subjective matters such as space size, lighting, energy use, environmental conditions, health, and safety, or accessibility for wheelchair users. Trials of the DQI have revealed that it enables the discussion of design quality in the round. The DQI was developed to address the product from the beginning, and its main goal is to model product quality. It can be improved by incorporating a statement of minimum requirements and a record of the material on which the exercise was based.
7	Rizwan U. Farooqui & Syed M. Ahmed	Designing for Quality: An Empirical Study of Design Quality Indicator (DQI) Tool	designing for quality in buildings is all about creating buildings and spaces that are fit for purpose, built to last, and lift users' spirits. Implementing the DQI significantly reduces the amount of time spent on design and rework by creating a common language for discussing design between technical and non-technical groups, as well as common metrics for procurement teams to evaluate whether a proposed design is "good" or what aspects of a design are "not good." It eliminates the guesswork in building	Design is a cyclical, iterative process in which solutions are refined gradually through creative leaps. This paper discusses the Design Quality Indicator (DQI) for improving building design and measuring construction performance. The effectiveness of the client-architect relationship is a major factor in making design decisions, as well as community concerns, site size, configuration, topography, geotechnical characteristics, ecological features, cost of building technology implemented, demands and constraints set by the project schedule, and coordination between project teams. The most important factor in determining the design quality of a building is whether it meets user requirements and what users think and feel about it. The DQI is a tool that helps the procurement team of a building define and monitor design quality at key stages in the development process.

			design by converting individual subjective perceptions into objective measurable results.	It focuses on the needs of the end user and contributes to the development of a more sustainable building. It is a questionnaire that includes questions that are relevant at any stage of a building's development and can be revisited and re-used throughout the project's life. The brief version of the DQI questionnaire allows project goals to be clearly defined while also addressing end-user feedback. The mid-design version allows the client and design teams to assess whether early goals were met and to make adjustments in focus and quality as needed. The in-use version is used to gather feedback from the project team and building users to make improvements for the next project.
8	E. Sarah Slaughter	DQI: the dynamics of design values and assessment	The DQI is a negotiating tool that allows parties to decide and convey their interests before negotiating a compromise based on differing values and bargaining power.	The DQI has evolved from a fixed measure of relative quality to a negotiating tool among the parties. It provides a means for the parties to decide and convey their interests before negotiating a compromise based on differing values and relative bargaining power. The owner always has the most negotiating power, while designers (including architects and engineers) and builders have moderate bargaining power. Depending on their ability to choose whether or not to occupy the building, the inhabitants may have very little or a lot of bargaining power. Negotiation begins with a compromise on specified values set by each party, determined by their relative bargaining position. The DQI is used to identify and negotiate preferences over time,

				minimizing measurement and weighting difficulties. When the building is finished, it can serve as a starting point for determining how well it satisfies each party's expectations.
9	J. K. Whyte, D. M. Gann, A. J. Salter	INDICATIONS OF DESIGN QUALITY: USER INPUT AND THE DEVELOPMENT OF THE DESIGN QUALITY INDICATOR TOOLKIT	The DQI project has raised the profile of design quality within the UK built environment sector and opened up the debate. Establishing benchmarks across projects with the desire of professionals to represent and discuss the complexities of design issues within individual project teams. The DQI is successful in framing the discussion of design quality by providing a common language, but there is a danger of adding complexity to the analysis, hence removing transparency. The paper considers the tool as a form of user toolkit to involve a range of stakeholders in the design process. The use of a tool such as the DQI in benchmarking requires further consideration and the validity of such use needs to be tested.	The Design Quality Indicator (DQI) is a tool that helps the procurement team of a building define and monitor the evolution of design quality at key stages in the development process. It focuses the team on the needs of the end user throughout the process and contributes to the development of a more sustainable building. The most important factor in determining the design quality of a building is whether it meets user requirements and what users think and feel about it. The Design Quality Index (DQI) is a questionnaire that can be used at any stage of a building's development and can be revisited and re-used throughout the project's life. This paper discusses the authors' involvement in developing the toolkit, user feedback from the beta-testing phase, and developing an interactive web-based interface. It is an example of a 'user toolkit' which allows a wide range of users to express their preferences and provide feedback during the design process. The authors developed the Design Quality Indicator (DQI) to develop an interactive, user-centered approach to design quality. It is made up of three parts: a conceptual framework, a data collection tool, and a weighting mechanism. Limited pilots were conducted to test early prototypes, and the tool was redesigned to accommodate the learnings from the tests.

			To ensure a valid process, it is important to make explicit the assumptions in the model, the characteristics of different user groups and the degrees of uncertainty and ambiguity associated with different responses. To visualize the results, three visualizations have been developed, but they only show the score attained with no indication of the maximum score.	The DQI Trailblazing Scheme was the primary design evaluation activity in the UK built environment sector between July 2002 and July 2003, allowing organizations to sign up for and use the DQI assessment on live projects. The Trailblazing Review conference was a defining moment in the transformation process, as DQI Facilitators raised critical concerns.
10	Thomas A. Markus	Lessons from the Design Quality Indicator	The Design Quality Index (DQI) is a questionnaire that uses subjective responses from questionnaires as the foundation for "measurement" and setting benchmarks. However, the ambiguity surrounding the term "design" makes it difficult to measure the design quality of a building. Quantitative analysis may involve applying certain metrics or statistics to the subjective data to analyze any of a wide range of concerns. The methodological rigour necessary for the	The Design Quality Index (DQI) is a questionnaire that uses subjective responses from questionnaires as the foundation for "measurement" and setting benchmarks. However, the ambiguity surrounding the term "design" may make respondents' comments even less comprehensible. The assertions on subjectivity and objectivity are challenging to support, as precise predictive and performance metrics and audits are available. Quantitative analysis may involve applying certain metrics or statistics to the subjective data in order to analyze any of a wide range of concerns. This instrument was not subjected to the same controls and checks as regular opinion surveys and market research questionnaires, making it difficult to measure the design quality of a building.

			results to have significance is what should have focused on instead of the general idea behind doing this.	The methodological rigour necessary for the results to have significance is what they should have focused on instead of the general idea behind doing this. Statements regarding electrical systems or fire safety are combined with claims that the building is inspirational, alters your perspective of the world, tells a story, or develops new knowledge. The second set of remarks, particularly those in the "impact" section, is drawn from interviews with architects who frequently attribute such qualities to architecture in general and to their own constructions in particular. The absence of clear and consistent knowledge of spatial organization obscures the important functions that buildings play in supporting social organization.
11	Derek S. Thomson, Simon A. Austin, Hannah Devine-Wright and Grant R. Mills	Managing value and quality in design	The notions of value and quality were reviewed to understand how they can be related to construction activity. A differentiation between terms and appropriate definitions has been proposed for quality, qualities, values and value. The DQI could have an important role in value delivery, and the focus should be on establishing a process for periodic application of the tool during design and construction. Further research is needed to develop a common	The construction industry must engage customers in a value delivery debate to understand their needs, and the Development Quality Indicator (DQI) could be used to develop solutions that explicitly respond to shared values. UK Prime Minister Tony Blair has made a similar case for Better Public Buildings, but the industry still has a long way to go. The current approaches to "quality" delivery do not aim to ensure that characteristics that reflect the consumer's values are ingrained in a good or service. Quality control seeks to show consistency in product qualities produced by production procedures, while quality assurance aims for similar consistency in service delivery. Snagging lists are a typical way to handle quality issues, but they also signify a failure because they are a reaction to flaws.

			value language to engage stakeholders, and the synthesis of project values and their mapping onto design activities that result in product qualities.	Quality assurance accreditation is a requirement for engagement for some clients, and benchmarking initiatives involve an internal assessment of process quality. Value measurement and assessment can guide management decision-making in the latter scenario. Vitruvius' three principles of Western architectural design form the basis of the DQI framework, which converts the three indicators of functionality, build quality, and impact for usage in a modern environment. The DQI is now being piloted in 100 organizations and strategies for its application are being developed. To recognize and comprehend the values pertinent to any building project, stakeholders must be involved in the design process. The process of translating project values into product attributes involves iterative interaction between stakeholders and a DQI toolset tailored for each project.