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Designing for Quality: An Empirical Study of Design Quality Indicator (DQI) Tool

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ABSTRACT

Good design is essential for achieving value for money in construction and provides the arguments, evidences that make places work better. But this is not just about buildings being completed on time and within budget; it is also concerned with ensuring that the costs of operating buildings over their whole life are optimized and that those who use and work in buildings gain real value from them. Bad design can severely interrupt on the functionality of a building and in extreme cases curtail its useful life. In this paper, discussion is made about the Design Quality Indicator (DQI) for improving the design of buildings and measuring performance in construction by providing feedback and capturing perceptions of design quality embodied in buildings.

Keywords: Design Quality, Design Quality Indicator,

1. INTRODUCTION

The delivery of better quality development (as one particularly crucial objective of a quality planning service) involves processes that take time, for example, negotiation, consultation design, etc.

Considering the design, in order to understand why time is such a crucial factor, it is important to first understand the nature of design as a process. In this regard, design is used in the broadest sense to suggest a value-adding activity that is integral to good planning, urban design and architecture or engineering. In brief, the activity of creating and managing the built environment is a creative problem-solving activity in which objectives and constraints are weighed up and balanced, and solutions which best meet a set of defined needs are derived. All design activities follows essentially same process.

In this conception, design is seen as a cyclical, iterative and 'universal' process in which solutions are gradually refined through a series of creative leaps. When, a problem is identified and an image of a likely solution is generated. This solution is then presented or articulated in a form which can be readily understood (i.e. through a plan); subsequently it is tested against the original problem or set of objectives, before being rejected or re-imaged to further refine the solution.

This cyclical process of imaging, presenting, testing and re-imaging relies on the adequate flow of information as a means both to inspire the creative process and to test ideas. In the case of construction project, this might include information about the site and context, planning policy, councilor preference, developer and designer objectives, community aspirations and so on. The process refines the proposal continuously and moves towards a final acceptable solution.

In this paper, a discussion is made about the Design Quality Indicator (DQI) for improving the design of buildings and measuring performance in construction by providing feedback and capturing perceptions of design quality embodied in buildings.

2. NEED FOR DESIGN QUALITY

Sound and creative design is an essential ingredient in achieving value for money. Value for money in construction is about more than delivering a project to time and cost. A good building project must also contribute to the environment in which it is located, deliver a range of wider social and economic benefits and be adaptable to accommodate future uses. The ultimate aim is to deliver construction projects that meet the requirements of the business and all stakeholders, particularly the end users. An early investment in design quality can make service delivery significantly more efficient and will enhance the working environment for all those who use them.

"Design represents a minute proportion of the lifetime cost of a building – less than one percent – but done well it has a disproportionate impact on how well the building and its surroundings perform." **Sir Stuart Lipton**

Design quality is critical for the success of any construction project; It is the responsibility of all clients to commission projects of which present and future generations can be proud. There is a significant role for clients in promoting good design. It does not necessarily involve high cost; good design will provide value for money in terms of total cost and cost-in-use. It will also address issues of sustainability and environmental concerns.

3. FACTORS AFFECTING QUALITY OF DESIGN

Every project situation is different and presents a different set of requirements and limitations, unique set of cultural, environmental, technological, and aesthetic contexts to be considered creating its own set of challenges and opportunities.

Design brings to the surface the major considerations inherent in a situation. It is a process that is both problem-seeking and problem-solving. While every project has a unique combination of design influences, some of the more important ones are

Clients (inhibitor of scope of a project): some have a clear idea of a program, budget, and other project objectives, including the final appearance of the building. Others look to their architect to help them define the project objectives and to design a building that meets those objectives. In both cases the effectiveness of the relationship between client and architect is a major factor in making design decisions throughout the project.

Community concerns & surrounding context: The surrounding build fabric provide clues for approaching site development as well as the building design, influencing its configuration, use of materials, colors, and textures.

Site: These factors include site size; configuration; topography; geotechnical characteristics; ecological features, including vegetation, wildlife habitats, water elements, and drainage; and accessibility to property.

Cost of building technology implemented: Once the funding limits or budget of a project is derived it plays a major influence on subsequent design decisions, from building size and configuration to material selection and detailing.

Schedule: The demands and constraints set by the project schedule may indirectly influence the workers performance & how specific issues are explored and considered during the build process.

Coordination between project teams.

4. HOW TO MEASURE DESIGN QUALITY

It is hard to quantify design quality as it consists of both objective and subjective components. Whilst some indicators of design can be measured objectively, others result in intangible assets, depending in part on the subjective views, experiences and preferences of the people asked.

The most important measure in any evaluation of a building's design quality is whether it satisfies user requirements and what users think and feel about it. However, understanding the views of users is not easy: there might be many different and conflicting views held by individuals and groups. Everyone involved in the project

have different perspectives on the same facility. Professionals and researchers working in the production of the built environment have developed sophisticated approaches for capturing and understanding user requirements, with new approaches to briefing and through post-occupancy evaluation. There are many other tools proposed in the manufacturing industry, but much of them left a skeptical view in the construction industry whether they suits or not. Following is discussed one such tool which is especially designed for evaluating design quality of construction projects.

5. DESIGN QUALITY INDICATOR (DQI) TOOL

INTRODUCTION TO THE DQI TOOL

The DQI as a product quality measuring tool has been developed to work with the existing performance measures from Constructing Excellence, in particular the Key performance Indicators- KPIs which assess the process – the delivery of the building. It also complements sustainability tools.

The DQI is a tool which assists a building's procurement team to define and check 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 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.

It is the pioneering process to evaluate the design quality of buildings. It focuses the team on the needs of the end user keeping in mind the end user throughout the process and helps develop a more sustainable building.

There are two versions of the DQI:

- The DQI is a generic tool and can be applied to any building project.
- The DQI for Schools is a version of the tool which is more applicable to the needs of schools and can be used on all types of school project including Community, Foundation, Voluntary Aided, Voluntary Controlled, Academy, City Technology College, Special School and Independent Schools.

WHEN CAN DQI BE USED?

The DQI is basically in the form of a questionnaire and encompasses questions which are relevant at any stage in the development of a building and the tool can be revisited and re-used throughout the life of the project. Ideally the DQI is used at every key stage of the development; it can also be used repeatedly at a particular stage.

There are four versions of the tool and DQI automatically adjusts the questions displayed so they are relevant to the particular phase of the project that is being assessed.

Brief version of the DQI questionnaire allows the project aspirations to be clearly set, addressing the opinions of the end users, and can be used through strategic briefing stages to detailed brief to set priorities and answer questions such as:

- What do we want?
- Where do we want to spend the money?

Mid-design version allows the client and design teams to check whether early aspirations have been met and allows adjustments in focus and quality to be made accordingly. It can be used throughout the design phase when the project can still respond to change.

Ready for occupation version is used before occupation to check whether the original intent has been achieved.

In-use version is used in order to receive feedback from the project team and the building users to help make improvements for the next project, and can lead on to more thorough post-occupancy studies.

SCOPE OF DQI TOOL

- Assist in informing choice in design decisions.
- Be useable by anyone – including professional designers and lay users .
- Raise public awareness of the importance of design.
- Be capable of measuring an individual's view of design quality against their own chosen intent for the building.
- Allow participants to compare and contrast different options.
- Be of a flexible, multipurpose and generic nature, and useable on many different types of buildings.
- Be useable at different phases in a buildings' lifecycle: conception, design, construction and in-use.
- Be swift to use, with a simple and clear interface.

COMPONENTS OF DQI TOOL

The DQI questionnaire:

The DQI questionnaire is a short, simple and a non-technical set of statements that collect the views from all by looking at the functionality, build quality and impact of buildings.

- **Functionality** is concerned with the way in which the building is designed to be useful and is split into use, access and space.
- **Build quality** relates to the performance of a building fabric and is split into performance, engineering and construction.
- **Impact** refers to the building's ability to create a sense of place, and to have a positive effect on the local community and environment. It is split into character and innovation, form and materials, internal environment and urban and social integration.

The process:

- The DQI can be initiated by anyone, but its use will need to be organized by somebody from the project delivery team.
- After a company/ project team decides to use the DQI a DQI leader is appointed who registers the assessment and distributes the relevant information to the respondents.
- Depending upon the number of end-users in a project, the DQI should be completed by 5 to 25 DQI respondents.
- DQI facilitator is also recommended who has been trained to assist in the use of the DQI.

6. EXPLORING DQI USING A CASE STUDY

In this case study the DQI methodology is implemented during the 'Design Briefing stage'.

Building type: Educational Institution- Parliament High School

Architecture firm: Haverstock Associates.

The Haverstock associates is a small architecture firm and are committed to the implementation of DQI concepts in order to improve the lives of the people using the structures designed by them.

Parliament Hill secondary school is situated in a conservation area near Miami, Florida. The firm won the contract through the competitive bid process. The condition of the project set out by the Local Education Authority (LEA) was that the quality indicators would need to be implied.

The LEA brief commissioned the design and supervision of new school accommodation, the scope and brief to be decided after completion of a feasibility study, accessibility audit and curriculum analysis, subject to planning and budgetary constraints.

The workshop took place during the early design stage of the project. The participants consisted of the LEA senior technical officer engineer, the firm's mechanical engineer, two LEA project managers and an LEA educational inspector; school facilities manager, planner, governors, teachers, senior school management and students.

It made everybody aware of the initial design development that had been undertaken and opened up lines of communication by introducing all the different individuals who would have an involvement with the building at some point in its life time.

It also enabled to carry out further consultation to find out what types of modern buildings people liked and disliked, which initiated idea of what type of building/s and materials people really felt they wanted to see in the end product. The information gained from this process was a vital part for the firm's brief. The DQI questionnaire provided well structured framework for the discussions, and raised issues which could otherwise have been overlooked. It also added value for the client as the DQI enlightened them to the thought process behind our design.

7. BENEFITS OF IMPLEMENTING DQI

- The overall result is an improved product and importantly one can learn from the process because the DQI allows us to measure how the improvements are made.
- The DQI will be revisited once a designer has been appointed. It will be incorporated as a checklist against the client's original aspirations and will be used as a benchmark throughout the construction process.
- The DQI questionnaire provides a well structured framework for the discussions, and raise issues which could otherwise have been overlooked. It also added value for the client as the DQI enlightened them to the thought process behind our design.
- From the use of the DQI one will be able to use the results from the original scheme as a secondary brief for the new site, the DQI helps as a checklist to see that the different end-user views have not changed.
- The 'weighting' element of the DQI is very important in prioritizing what were the most important budgetary and planning restraints that could not be taken into account.

8. CLIENTS' OPINIONS ON DQI BASED ON INTERVIEWS

- The end- users found the process to be most helpful in putting across their requirements. They felt that notice was being taken of their needs and that the building was not being designed by people who would normally not know their working requirements.
- For the companies, the DQI helped to frame a benchmark for quality and enabled them to produce buildings with good impact and functionality by enabling them to consider the most important design factors in the initial stages of design.

- It involved looking back at existing building (with DQI principles) and also forwards the experience to the new buildings and able to bring together a diverse set of representatives of users of the existing building.
- The companies felt that the involvement of the design team for the new building enabled them to rapidly reach an understanding of the specification, very importantly, the subjective aspects that linked the quality of the environment to the brand, marketing and success of the company as a whole.

9. ACTION PLAN FOR A COMPANY TO IMPLEMENT DESIGN FOR QUALITY CONCEPT.\

1. Select a person from the project team to organize the DFQ, who is familiar and completely understands the concept of the same.
2. Let everybody the company know about the company's decision to implement DFQ.
3. Elect a DFQ leader who registers the assessment and distributes the relevant information to the respondents.
4. Form a DFQ committee and commit to it.
5. Select DFQ respondents (5- 25 in num) according to the type of the project.
6. Train all the respondents and explain the DF process and present the whole subject in a way that would be understood by all participants (end users).
7. Develop the workshops that promote good communication between parties and focus people's attention on quality issues.
8. Provide a useful report following each of the sessions which capture key points from the user group conversations and include graphics to help participants visualize how well the design is achieving their aspirations.
9. Take all the key points and implement those in the design process.
10. Keep records for future use.

10. CONCLUSIONS

In conclusion the designing for quality produces good design which is all about providing buildings and spaces that are fit for purpose, built to last and lift the spirits of users. Implementing the DQI dramatically decreases the amount of time spent on design and rework by creating a common language to discuss design between technical & non-technical groups and common metrics by which procurement teams can evaluate whether a proposed design is "good" or what aspects of a design are "not good". It takes the guesswork out of designing a building by converting individual subjective perceptions into objective measurable results.

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