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Attributes and descriptors for building performance evaluation

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Abstract The feedback obtained from users/occupants would become the primary data set to evaluate performance of any built facility. Meeting user needs, expectations and aspirations are the prime objectives of a facility provider. It becomes necessary to evaluate the built facility with respect to meeting user needs/expectations, in order to obtain right feedback during building performance evaluation. Among various methods being used to obtain user feedback, questionnaire remains the foremost and most commonly used tool. The quality of feedback and its subsequent analysis entirely depend on the robustness of the questionnaire which in turn depends on its content. Such survey instrument comprises of questions framed on various attributes of a built facility. The purpose of survey dictates the nature of questions and the attributes about which the data are collected. These attributes can be categorized into functional attributes, maintenance attributes, and societal attributes.

In order to obtain the right feedback in levels of satisfaction with respect to these attributes, there is a need to have appropriate descriptors for incorporation in a survey instrument. This paper identifies attributes that indicate building performance and provides simple description of these attributes based on which items can be generated for a questionnaire. Such items can enable any user/occupant to easily understand the characteristics of these attributes and offer an objective feedback during questionnaire survey.

Introduction

The primary purpose of buildings is to meet the needs/expectations of users/occupants in providing with conducive, safe, comfortable, healthy and secured indoor environment to carry out different kinds of activities ranging from work, study, leisure and family life to social interactions as brought out by Ibem et al. [1] Meir et al. [2] opine that buildings are constructed and managed based on standards and specifications established by governments, professionals and experts who

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are supposed to have adequate knowledge of user needs and expectations. As rightly pointed out by Kian et al. [3], these standards and specifications do not conform to the changing needs and expectations of users. Building performance can be enhanced by regular performance evaluation, exploring and understanding user needs, expectations and aspirations [4,5]. Put succinctly, building performance evaluation primarily seeks to improve the quality of design, construction and management of buildings and by extension, promotes sustainable built environment [1]. Vischer [6] suggests that it also helps in understanding how occupants feel about their buildings, and thus provides basic information on user needs, preferences and satisfaction. User feedback is obtained through questionnaire and its content depends on the purpose for which the surveys are carried out. Purposes may be issues pertaining to technical, functional, financial, environmental, and societal aspects. The satisfaction level can be measured through metrics/indicators called attributes. In order to obtain the right feedback, these attributes need appropriate description for incorporation in a survey instrument. This paper identifies attributes that indicate performance of buildings and provides examples for their simple description that can enable user to easily understand their characteristics and offer an objective response during the questionnaire survey.

Objective

The objective of this study is to establish a methodology to formulate questions that can form part of a questionnaire, based on descriptors of attributes in order to elicit more objective user response during performance evaluation of built facilities.

Methodology

The methodology to achieve the above objective includes understanding the stages in formulation of a questionnaire, identification of attributes that indicate user satisfaction and description of the characteristics of these attributes. The number and nature of attributes are governed by the type of facility being assessed and the purpose of evaluation. After identification of the attributes, the characteristics of each attribute will be listed based on the theoretical content the attribute represents. Attributes and characteristics once identified will be vetted through opinions obtained from a group of selected experts of the construction industry comprising of architects, engineers, consultants and academicians. Methodology also includes transformation of these characteristics into question items that can be incorporated in the questionnaire to obtain user response. Formulation of these items will be in a manner where all types of participants can identify the purpose of questions in consonance with the researcher and furnish feedback accordingly. Methodology also involves customizing the rating scale for each question.

Theoretical issues

Questionnaire

Janice and Martyn [7] have defined questionnaire as a survey instrument that has been used to obtain feedback from the users as part of user satisfaction surveys. A questionnaire becomes a good survey instrument when all desired information of the researchers is received in the form of data. The contents of the questionnaire generally contain the personal profile of the participant and their satisfaction level on the various identified attributes distributed on a suitable Likert scale preferably on a scale of 1–5. They also suggest that a good questionnaire should enable collection of information in a standardized manner which when gathered from a representative sample of a defined population, allows inference of the results to a wider population. However, the main criterion in such a questionnaire is that the underlying assumptions about the language and interpretation of the questions by the researcher and the participant should be similar. If it is not so, then the results obtained may not be useful.

Stages in formulation of questionnaire

Janice and Martyn [7] have listed the stages of formulation of any questionnaire undergoes the following stages.

Content of the questionnaire

When developing a questionnaire, items or questions are generated that require the respondent to respond to a series of questions or statements. Participant responses are then converted into numerical form and statistically analyzed. Hence, the content in the questionnaire must reliably operationalize the key concepts detailed within specific research questions and must, in turn be relevant and acceptable to the target group.

Range of scale

There are range of scales and response styles that may be used in developing a questionnaire. It is important to be clear on the range of scale and the style of response that need to be adopted in formulating the survey instrument. Likert scale is the most widely used frequency scale. Likert type scale assumes that the intensity of experience is linear i.e. on a continuum from strongly agree to strongly disagree and also assumes that the attitudes can be measured. Generally, a likert scale of 5 is adopted for measuring satisfaction levels of participants.

Item generation, wording and order

Generation of items during questionnaire development requires considerable pilot work to refine the wording and content. Items need to be generated from a number of sources including consultation with industry experts, proposed respondents and also extensive literature review to avoid any bias in response. Consideration should be given to the order in which items are presented, positioning of questions on demographic details and avoiding double negative or double barreled questions. A mixture of both positively and negatively worded items may minimize the danger of acquiescent response bias i.e. the tendency of the respondent to agree with a statement or respond in a same way to questions.

Validation

In the process of developing a questionnaire, it is very important to conduct a pilot survey to validate the survey instrument. Nasrin and Trisha Dunning [8] have identified

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