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# Subjective factors in sustainable building

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**ABSTRACT:** In order to achieve a more sustainable use of the built environment, the concurrence of many factors is necessary. These are not always objective, measurable quantities. Within the building process, the subjective factors can be as influential as the objective ones, but much more difficult to recognize and predict. Assessment systems and energy simulations are two examples of tools that analyse the objective side, but show limitations when dealing with subjective elements in practice.

The present work proposes a classification scheme according to four main perspectives, which accounts not only for measurable factors, but also for the subjective ones. The expected outcome is a better understanding of the relationships between the different interests that participate in the decision-making process. A further purpose is to produce analysis tools that account for those factors that neither assessment systems can consider, nor simulation software can model.

Conference Topic: 2 Design strategies and tools

Keywords: subjective factors, assessment systems, simulation

## INTRODUCTION

The built environment is necessarily influenced by the society that produces it. This is mostly due to its double condition as a product of technology, and as the container of the different human activities.

On the other hand, as stated in the Rio declaration, sustainable development concerns mainly the human systems. When talking about sustainability, we are necessarily referring to the sustainability of a certain social and cultural system that has suffered (or achieved) a displacement from the natural state. It is the sustainability of this displacement what we are concerned about.

Buildings also function as a link between the material world of nature, and the symbolic world of the human cultures. Consequently, when considering the problem of sustainable building, all aspects of society must be taken into account. Many of these are subjective and therefore cannot be measured, which makes them much more difficult to assess and predict than the objective, measurable aspects.

Subjective factors may condition the selection of the site, specific technology applications, general shape of buildings, typologies, etc. Moreover, they determine the way buildings are inhabited, and thus can alter the efficiency of the building's systems.

The present work introduces a possible classification scheme that intends to help in producing new analysis tools for a better understanding of the different interests that take part in the formation of the built environment. Some applications to sustainable building problems are presented as a first approximation. Further analysis possibilities are suggested.

## 2. SUBJECTIVE – OBJECTIVE

Among the different disciplines that concern the built environment, we can differentiate between those that deal mainly with objective aspects, and those that deal with subjective aspects. The former can be determined empirically and are concrete. The later depend directly on the subjective experience of the observer and cannot be quantified (except by using statistical analysis based on surveys). As a first approximation we can identify the subjective perspective with that of the architect, and the objective perspective with that of the engineer (although both disciplines have aspects of the other's perspective). McCleary describes in [4] this difference in terms of humanization of the space as contrasted to the logic of structure, or dwelling as opposed to structuring; the architect begins the design from the former, and the engineer from the later. Although he refers to the structural engineer, the same could be said about engineering in general.

As examples of subjective aspects we could mention the esthetical, the functional, or the historical. In all cases they depend on a particular perception (from either the designer or the user). Among the objective factors we can mention the economical (in the sense of cost-profit analysis), climate, or the properties of materials. The main difference from the precedent is that these can be quantified and therefore compared according to different criteria (economic, energetic, etc.).

These two hemispheres of subjective and objective factors are not independent, but in fact are two perspectives of one phenomenon that is the built environment. Any modification done in response to

subjective factors will have to modify the objective factors and vice-versa. For example, the design of a façade according to aesthetic values will restrict the possible technological solutions, choosing a certain air conditioning system will determine the possible distributions in the plan, the occupant's perception of comfort also determines such factors as the use of blinds (and therefore the access to daylight) or the required indoor temperature.

### 3. SPECIFIC – NON-SPECIFIC

As stated above, the built environment is conditioned by the culture that produces and inhabits it. Therefore, the disciplines that deal with it cannot be separated from the particular circumstances in which they operate.

As technological products, buildings are influenced by modes of production, the state of economy, or climatic conditions, among others. As containers of human activities, they are influenced by functional requirements, modes of operation, human physiology, etc. All these aspects are beyond the specific scope of building disciplines and determine their intrinsic heteronomy.

Therefore, a second differentiation can be made between those aspects that are specific to these disciplines and those that arise from their interaction with the society in general.

If we combine both classifications, the resulting scheme can be divided into four sectors that include the different aspects, subjective and objective, specific and non-specific. Again, as a first approximation, we can identify each sector with the perspective held by one of the four main actors in the building process.

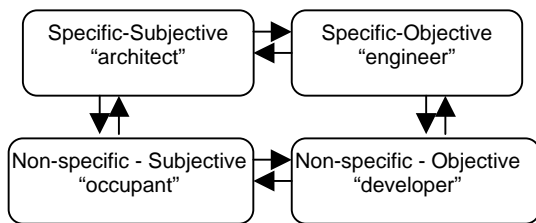


Figure 1: Main actors in the building process

These four sectors represent four perspectives or approaches to the built environment. As before, we must note that the different roles are approximate and do not correspond necessarily with actual persons.

Each one of these perspectives will have a different interpretation of the built environment, and therefore will consider primarily a different set of factors and priorities. Hence, in order to implement sustainable building practices, it is necessary to understand the perspective from which each actor is positioned, the different kinds of aspects they give importance to, and the ways for operating with each one.

### 4. RELATIONSHIP BETWEEN THE VARIOUS PERSPECTIVES

Some examples of the relationship between the different aspects of sustainable building and the way these are experienced by each perspective are presented next.

The Specific-Subjective perspective was associated above with the architect's role. This does not mean that architects cannot consider material or constructive aspects of buildings. However, we may recognize a certain mode of conceptualisation in which the subjective aspects are predominant (Figure 2). In this case, the selection of materials or components, for example, will be subordinated to the image they communicate. In the case of sustainable materials, it will be more important (from this perspective) whether such materials express their quality of "sustainable", than their actual effect on sustainability.

This example can be extended to other matters of design, concept, or image. Sometimes, this kind of valuations may appear as opportunistic (using the image instead of real effect), but it should be considered that they respond to real needs that have to be taken into account.

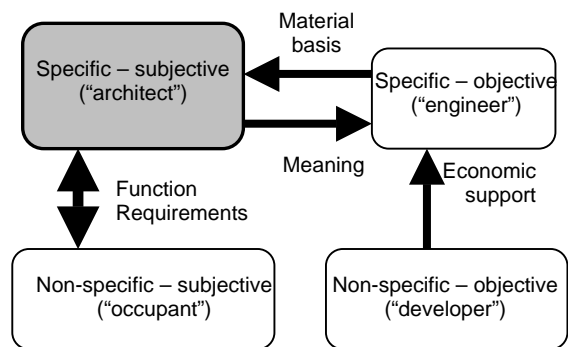


Figure 2: Specific-subjective perspective

The non-specific-objective perspective can be associated with the role of the developer (or the client), and is related to the view of building as investment (Figure 3). The main concern of this perspective is economic profit.

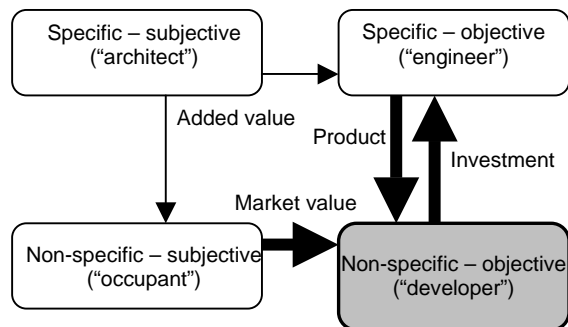


Figure 3: Non-specific - objective perspective.

Although this perspective is objective (as much as the cost-benefit analysis is a mathematical calculation) market value depends on the occupant's

perspective (aspects like convenience, style, or fashion) and therefore depends on subjective factors. When considering sustainable building, this perspective is associated to economical sustainability.

These two cases exemplify differences in the perception of problems related with the built environment, and demonstrate the necessity of considering all the perspectives in order to effectively apply a particular building strategy (as in the case of sustainable construction methods).

This is explained in [6] stressing the importance of social practices over that of technological fixes, and the need for complementing environmental, economic, and sociocultural sustainability.

## 5. SUSTAINABILITY AND THE RELATIONSHIP BUILDING-NATURE

Many of the concepts associated with sustainability refer to some type of resource distribution problem. Intergenerational equity, for example, reflects on which generation should make use of which resources, and to what extent. Environmental ethics considers whether humans have more right than other species to exploit natural resources. In this sense, sustainability could appear as being mainly a problem of the objective hemisphere, since resources are objective measurable entities. Noticeably, however, the values associated with each decision require the subjective perspectives.

As stated before, buildings are a link between the material systems of nature and the cultural systems of human meaning. Moreover, the objective and subjective aspects of the built environment are interrelated in many ways. However, the operations performed from subjective and objective perspectives are not necessarily coherent. This means that the decisions taken for subjective reasons may be contradictory with the objective intentions and vice-versa. As Hagan explains in [3] the architectural expression of sustainability does not necessarily imply that the building is a sustainable one.

As a result, we find an ambivalent relationship between objective and subjective hemispheres: they should be differentiated, but cannot be dissociated; they are mutually dependent, but not necessarily coherent.

This defines the role of the subjective factors in sustainable building. Firstly, they are necessary in order to comply with cultural requirements. If sustainable buildings do not respond to user's expectations, they are not perceived as desirable, and will have less chance to be developed. Secondly, the architectural expression of sustainability should not impede an objective assessment of the building's sustainability. And thirdly, subjective factors should not obstruct the application of sustainable practices. For example, it is well known that energy saving strategies should be implemented at a very early stage of the design process.

From the above, the first two statements refer to the differentiation between objective and subjective aspects; and the third one refers to their coordination.

Differentiation is necessary in order to take into account all the requirements of a sustainable building, and find appropriate solutions to each one. Coordination is necessary since subjective and objective factors affect each other.

The architectural expression of sustainability could be, in this context, a means to relate the building process (from design and construction, to occupation, use, and demolition) to the idea of sustainability. And by this way, establishing a sustainable culture.

## 6. SIMULATION AND ASSESSMENT

When considering the modes of operation related to the different aspects of the built environment, the use of computer simulations has to be considered among the objective ones. The experience of the users, or the creative process of an architect cannot be simulated (at the moment). Only comfort conditions can be predicted, based on previous statistical research (however, it should be noted that this is culture specific).

One of the main obstacles to the application of computer simulations in the design process is the difference of the conceptual frameworks that are used for subjective and objective aspects [1]. Notably, the concepts of continuity, scale, and hierarchy can be very different. Considering this, the scope of building simulations can be determined, and hopefully new ways of applying it to the design process can be developed.

Assessment systems have a similar condition since they intend to measure the degree of sustainability of a building and therefore can only deal with objective quantities. In order to compare the performance of different buildings, the system can only use methods that can be repeated without biases in each case.

Some assessment systems [2, 5] utilize weighting factors in order to account for the circumstances in which different buildings are placed. These are usually decided based on the opinion of experts; thus it could be argued that they respond to some kind of subjective impression. However, these factors operate on objective quantities, and are based on the knowledge of objective aspects of the built environment, and essentially, they do not assess subjective experiences.

## CONCLUSION

The built environment, as one of the main expressions and instruments of society, has an important role in the realization of sustainability. This is particularly important since buildings not only are material objects, but they also contain most of human activities.

The interrelation between subjective and objective factors means that when considering new modes of building practice, all aspects should be taken into account. On the other hand, the intrinsic differences in the modes of operating with them, or their effects, make it necessary to differentiate them.

The scheme proposed differentiates between four approaches to the built environment. These can be identified with the main actors in the building process. By understanding the perspective that each actor holds, their set of priorities, needs, and values (as well as the way of dealing with them) can be clarified.

Sustainability assessment systems and computer simulations operate over the objective aspects of the built environment. This does not imply that they are less important, but it is necessary to acknowledge this characteristic in order to understand their scope and applicability.

Further research could provide a complete analysis of the relationships between the different perspectives, and their incidence in the building cycle. It could also help analyse the role of sustainable architectural expression as a means of advancing a more sustainable culture.

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