

A PILOT STUDY OF THE PREDESTINED PLANNING CONDITIONS AND THE INDOOR ENVIRONMENT

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ABSTRACT

A pilot study has been conducted to find out if and how the building process influences the indoor air or the perception of the indoor air. As the first part of this investigation, a media study of what are considered to be healthy and unhealthy buildings was performed. From this media study two buildings were chosen and their building processes were examined more closely. This was carried out as a qualitative interview study with different people who had been involved in the building process. A tentative result of this interview study is that the degree to which the future tenants had been involved in the planning of the building was important for whether they regarded the building as healthy or not. This method for studying the problem seems to be a good way of finding possible weak links in the building process that may later cause indoor air problems.

INDEX TERMS

Building process, Healthy buildings, Indoor air, Systematic approach, Qualitative interview study

INTRODUCTION

When a building is planned, many different factors influence the indoor environment of the final building. Throughout the process there are different choices and decisions that influence the indoor climate. This study aims to find out whether the building proprietors and contractors lack some of the knowledge to be used in practice needed to provide good indoor air in buildings. There is a fair amount of knowledge about what may cause a bad indoor environment, but still there are plenty of complex connections that are not fully understood.

Some buildings are said by public opinion to suffer from the sick building syndrome (SBS). SBS has been defined several times, usually by defining whether people using a building have certain health problems (WHO, 2000). However, it is not the buildings that are sick, it is the people using the building that are sick. The reason people get sick is that there is some problem with the building. Yet SBS is probably not a single set of problems, it is several different problems that have to be solved. In many cases people may have the function of assessing indicators of when indoor air quality is good or poor. Instead of finding out afterwards that a building has problems and dealing with them, it must be better to have a structure to prevent them. The main goal for a building proprietor and contractor must be to prevent problems with the building that may cause poor indoor air.

The main hypothesis about what influences the indoor air during the building process is that everybody in the building process wants to create a good indoor environment. There is no

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systematic approach for the building proprietor or contractor to make sure that it turns out well, and this makes it easy to fail sometimes. There is a need to know whether it is the not fully understood connections or perhaps something else that leads to the problem buildings that may be produced today. Because of this, a study has been performed to see how the building process influences the indoor environment. This study is based on buildings with and without problems.

To prevent problems with poor indoor air it would be good to know during the planning what factors it is important to consider in order to prevent these problems. The aim of this study is to identify non-measurable factors in the building process that may give poor indoor air.

METHOD

A qualitative approach has been used in this pilot study. The main part of the investigation is an interview study in which two different buildings were closely examined. As the first part of this investigation, a media study of supposedly healthy and unhealthy buildings was performed.

A search in a database with articles from newspapers and the specialist press was performed. Articles written 1997–2001 about healthy and unhealthy buildings were searched for. This search was made to find out how public opinion views unhealthy and healthy buildings, to see what is written about them and where, and to find buildings that fulfilled the criteria for the buildings that were to be used in the study.

A questionnaire about what was supposed to influence the indoor air in the final building during the building process was compiled first. The aim was to find out how the building was designed and built. Questionnaires were compiled for different actors in the building process. There were different approaches for tenants, building proprietors, building contractors, and consultants, because they have different roles and different opportunities to influence different parts of the process (Ahlbom, 1993; Bogdan, 1998)

To find buildings that would supposedly give an answer to questions concerning the building process today and in the future, some criteria were set for the buildings.

- The buildings had to be built and moved into during 1990–1997. This period was chosen because it is usual for problems with indoor air to show up when the building has been used for some time, but it is also important that the building process, standards, and materials used were similar to those current today.
- The buildings had to contain only offices or dwellings without any industrial process in the same building. If there is any kind of industry in the same building it may be difficult to separate problems caused by the industrial process from those caused by the building itself.
- At least 10 persons were to have been using the building on a regular basis, preferably several more. The number of persons using the building could not be too low, as it should not depend on only some people whether the building is considered good or not. Then the result could be due to the people that were especially resistant or especially sensitive, and that was not the purpose of the study.

- The buildings were not to have been significantly rebuilt. If they were considerably rebuilt then the original building process is obviously not that important for the indoor environment.

The qualitative interview study started with contacts being established with the proprietors of each building. They were asked if they agreed about what was found beforehand, in the article study, about whether the building was considered healthy or unhealthy (or at least had been considered unhealthy if the problem had been taken care of). As many as possible of the fundamental facts about the building were ascertained at this stage, such as building area, the most common surface materials, building period, ventilation system, heating system, building cost and similar factors. One of the main purposes of these interviews was to find out whether the indoor environment of the buildings was taken into account during the different steps of planning, design and construction. Another main part of this stage was to find other persons that had been involved and had a central role during the different stages of the building process. After this first interview, other persons that had been involved during the building process were contacted. The important idea at this interview stage was to find answers to the questions that had been asked about the building and building process, not how many people were contacted.

Various aims were intended to be achieved during the different interviews. The main aim was not to find exact answers to the questions, but it was meant to be a structure for finding whether the building process, and in that case what part of the building process, had any influence on the future indoor air in the building. Another aim was to see whether there was something else that might give a hint about what makes the people who use the building experience good or poor indoor climate. The reason for choosing new buildings was that otherwise it was thought to be difficult to find information about the building process.

Each time a person was interviewed it was important to begin by not asking precise questions about the indoor environment, in order not to affect the answers; the interviewees might otherwise have tried to give the optimal answer instead of describing the real situation.

The interview study has been performed as a pilot study to find out whether this is a good method to ascertain if and how the building process affects the indoor air quality. In the interview pilot study two buildings were examined closely, one building with a good indoor environment and one with a poor indoor environment.

RESULTS

In the media study it was found that more than half of the articles about buildings with health problems were written about buildings in Stockholm, the city with the highest population in Sweden, in which 20% of the inhabitants of Sweden live. From the articles two buildings were chosen that corresponded to the criteria set for the buildings as described in the method section. Building A has poor indoor air according to the public opinion reflected in the articles, and this was confirmed by the proprietor when asked. Building B has good indoor air according to the public opinion stated in the articles and according to the proprietor.

The buildings used in the interview study were rather similar. Both A and B were built by building proprietors in the public housing sector, and the buildings are in fairly central locations. Both buildings were apartment buildings with more than 100 apartments in each building. In the marketing of the buildings it was said in both cases that the quality would be higher than usual. The two different cities where the buildings are situated are different in size

and the housing markets are different. The city where building B is situated has a rather tough market and it is very hard to get an apartment for renting, and it is more expensive to buy an apartment in this city than it is in the most parts of the country.

Judging by the interviews, it seems that the proprietor of building A had no discussions with the future tenants during the building process. The proprietor of building B had many different choices for the future tenants, both about how they wanted the apartment to be planned and about the materials and colours to be used for the floors and walls in different rooms.

During the building process the two buildings were marketed as having apartments that sensitive persons could also live in because higher-quality material than usual was used. Because of this a higher percentage of people with some kind of hypersensitivity may have moved into the apartments in both buildings.

During the interviews different persons were contacted. As seen in Table 1, it was rather awkward to find the right persons at all the stages of construction.

Table 1. Interviewed people's placement in the building process.

Placement in the building process	Building A	Building B
Building proprietor	X	X
Design stage		X
Construction stage		
Management of the building	X	X
Tenant	X	

DISCUSSION, CONCLUSIONS AND IMPLICATIONS

The housing market in the city where building A is situated is rather overheated. The tenants in this building may feel that they have less possibility to choose which apartment they move into, and because of this they may also feel that they have less ability to argue with the owner of the building about their apartment. In the same way, Norlén (Norlén, 1993) argues that tenants feel that their indoor environment is less satisfying than do people that own their own houses. People who feel that they cannot choose where to live may feel uncomfortable with the situation in an apartment.

A similar situation, but in working environments, has been studied by Sundell (Sundell, 1996), showing that if people have the possibility to influence their situation they are more satisfied. This may be because if someone feels that it is possible to have an influence it is possible to influence both in the right way and in the wrong way. If a tenant has knowledge about the building there is also the possibility to influence the indoor air to eliminate some of the contaminants that are common in modern buildings (Jones, 1999) and therefore to be more satisfied with the indoor air.

When the number of articles about buildings with problems is compared to the population in different areas, it is found that at least 60% of the articles refer to buildings in the Stockholm area. The other articles are about buildings in other parts of Sweden. The reason could be that the population in Stockholm is higher, but it is not that much more. Twenty per cent of the population of Sweden lives in the Stockholm area. Another study (Fyrhake, 1998) carried out in Stockholm also shows that buildings with problems are more common in Stockholm than in the rest of the country. That study shows that 7% of the buildings in Stockholm have

problems compared to 5% of the buildings in the rest of the country. This shows that problem buildings may be a result solely of which city they are built in. This could be due to a different pace of construction, to an overheated housing market, or to something else that this pilot study has not discovered.

There are some tentative conclusions that may be drawn from this study:

1. It is difficult to find the right answers to the questions. This is a qualitative study and therefore there are few answers that are completely right or wrong. A building process is very complex and therefore it is difficult to find out several years after the building was ready to move into whether something was wrongly done.
2. This study seems to confirm the hypothesis that there has been no systematic approach in the building process to provide good enough indoor air. However, there are some efforts to achieve a systematic approach to this in Sweden (Samuelsson, 1995) (Samuelson, Hult; et al. 1998). There was no systematic approach to obtain good indoor air in any of the buildings here. In one of them it turned out well anyway and in the other one it did not.

It would be good to find a systematic approach to what is important when trying to ensure a good indoor environment. This systematic approach should probably contain both technical questions and some important considerations concerning communication with the future tenants.

The pilot study shows that it is awkward to find the right persons in the contractor organisation. Because of this, a better angle to start with would be to contact a contractor that has built a building with good indoor air and one who has built a building with poor indoor air. But then there is a problem with the definition of whether the building is good or not. In the pilot study a building that was considered to have good indoor air according to articles was considered good, and the same correspondence was found in the buildings with poor indoor air. In all the interviews the interviewees were asked if they were of the same opinion. It is plausible that the same method for defining buildings, but without the media study, would give the same result.

I nevertheless believe that a well-conducted study of this kind may be the only way to find possible weak links in the building process that later cause indoor environment problems.

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