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TROUBLE SHOOTING IN AN OPEN PLAN OFFICE: CASE STUDY

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A telecom company reorganized one of its regional branches and acquired a small office building to house its collaborators who previously were treated to individual offices. The new layout called for open plan office at each of the three floors.
Quickly enough people working at two floors complained of the noise situation while the occupant of another floor looked happy enough. An acoustician was called to investigate whether there was ground for complaint and how to deal with them.
This paper explains the situation and submits the measurement results (sound levels during the activity and acoustic parameters of the floors) as well as the results of the questions and answers with the workers. It then explains how noise control solutions were effectively developed through cooperation with the workers.
Keywords: building acoustics, office, occupational noise

1. Introduction

A telecom company reorganized one of its regional branches and acquired a small office building to house its collaborators who previously were treated to individual offices. The new layout called for open plan office at each of the three floors of the building.

Quickly enough, people working at two of those floors complained of noise issues. The management took notice and decided to call an acoustician to first of all investigate whether there was real ground for a complaint about the noise situation at those two floors, and propose noise control solutions if need be. The acoustician remarked that as a significant part of the cost would be incurred through the travel costs it would not be complicated to include the last floor in the diagnosis. This was of particular interest to the acoustician as it would provide a supposedly acceptable situation for comparison purposes.

On the basis of experience, the acoustician proposed to perform acoustic measurements on the building and its fittings to check their suitability to the expected activities in the premises, and sound level measurements – duly completed by observations of the way of life at each of the floors under scrutiny.

Also on the basis of experience, the acoustician suggested a meeting with union and management representatives to analyse the measurement data and investigate possible noise control solutions. This was accepted. It was also decided to present and assess the final results during a similar meeting once the prescriptions had been implemented.

2. Description

The building under scrutiny that was occupied by the client featured:

- a ground level occupied by the secretariat, the director and a 15 strong service with the usual copy and printing service point. No complaints of any kind were originating from this service.
- Two floors that housed three services each, with the usual copy and printing services. Numerous complaints about the noise situation were received from the personnel housed at those two floors.

No obvious abnormality was spotted by the acoustician during his preliminary visit.

3. Diagnosis

The diagnosis aimed at:

- Assessing whether the main acoustic parameters in the building did comply with the standards requirements pertaining to the acoustics of open plan offices
- Assessing whether the ambient noise levels (noise from activities) at the various floors did comply with those requirements
- Analyse whether the behaviour and requirements of the personnel were compatible with the standard requirements.
- Observing the behaviour of the personnel during work hours. This was deemed to be a good opportunity to experiment with the French standard on open-space acoustics [1].

3.1 Building compatibility

Background noise level measurements were performed according to standard ISO 10052 [2] during off hours so as to minimize the disturbance for both personnel and measurements. In addition, spatial sound level decrease measurements according to ISO 11821 [3] were performed in aisles. Last, spatial sound level decrease measurements along the work stations were carried out using standard ISO 3382-3 [4].

Those parameters were found to be in the correct range according to the standards. However, the noise from sanitary appliances was found to be a bit too high for comfort.

3.2 Fittings compliance with standards

Furniture has an impact on acoustic comfort through reverberation control. Reverberation time measurements and spatial sound level decrease measurements were performed during off hours so as to minimize the disturbance to the personnel. The relevant values were found to be compatible with the standard's requirements. Its location (e.g. a workstation close to a noisy area) also plays a part in the feeling of acoustic comfort or annoyance.

Taking into account the previously mentioned observations, it was found out that the way from most workstations to either the toilets or the copy/printing station would be dangerously close to several workstations, which could lead to disturbance.

However, it was found out by observing the layout that there was no distinction of treatment between a set of work stations included within one service and another set with workstations belonging to different services.

3.3 Noise levels from regular activities

The noise level measurements were performed dosimeters that had been installed prior to the arrival of the personnel at workstations that were not earmarked for occupancy on that day. This enabled the acquisition of A-weighted noise levels without the physical presence of a measurer.

In addition, the acoustician would regularly patrol the place and perform 20 mn long measurements and observations.

It was once more confirmed that noise from people talking could be a real problem, especially when the talker belonged to another service.

3.4 Noise levels from particular activities

During the observations a number of unexpected acoustic events were found out. To start with, the cleaning service would appear at 10am and go throughout the office floors with a sweeper. As the noise levels over 15 mn would be over the 70 dB(A) mark at some workstations during the cleaning operations, the acoustician felt prompted to ask how annoying that was for the personnel around. The answer certainly was unexpected: people actually were happy as they could exchange a couple of words with the cleaner, ask for some specific cleaning to be performed if need be. In other words, it was part of the normal soundscape.

Another noise that did not go unnoticed was that of the toilets. The hissing noise from high pressure water that was heard all over the floor under scrutiny was a bit too present for comfort.

3.5 Discussions with users

Informal discussions with users did point the noise from the toilets mechanism; it was also pointed out that the disturbance from people making their way to or from this point was a real cause of annoyance. Two locations were especially targeted: toilets and printers.

Hinting that some noise barriers could be inserted people were prompt to point out that they would be happy with a noise barrier acting as a physical border with regards to other services at their floor. Regarding the possibility of implementing barriers within their own service, the answer was far less affirmative, excepted when it came to areas of common circulation (e.g. a path to the printers or the toilets.

3.6 Conclusions of the diagnosis

The diagnosis provided useful hints regarding some physical causes of so-called noise induced annoyance, as well as annoyance that did not always originate with noise.

3.6.1 Noise induced annoyance

The diagnosis did point out that there were a few complaints regarding the noise from people talking, especially when it originated from a different service.

It also pointed out to specific noise events such as toilet appliance noise.

On the other hand it did confirm that the acoustics of the building were suitable for the kind of activity developed there; it also gave ground for a few affordable improvements.

3.6.2 Annoyance

On the basis of observations it was felt by the acoustician that the problem was much more one of annoyance that one of noise control. Questioning the workers did point to the frictions between services. The questions were from a questionnaire developed by AFNOR, that constitutes a part of standard NF S31199; its use and lessons have been presented in a paper by Perrin & Chevret [5].

3.6.3 Discussion with the workers

The workers were initially reticent when it came to having representatives attend a presentation of the results and hints of possible solutions. Over a couple of hours they eventually accepted the results and then they were source of valuable suggestions and explanations regarding possible noise control solutions and improvements.

4. Prescriptions

On the basis of the diagnosis results, prescriptions were edited. Those prescriptions included the following:

- A stern reminder not to wander along the aisles while shouting into one's mobile phone.
- The implementation of noise barriers on top of the shelves bordering the work stations. On the suggestion of a worker representative, provisions were made to be able to attach those barriers on either side of the furniture. This enabled the possibility of some work stations enjoying more storage space while at other locations some temporary storage space was made available (e.g. near printers or copiers).

5. Conclusions

This rather simple case study brought some interesting lessons.

To start with, when the management was informed of a potential noise problem in their premises they reacted at once by calling an acoustician. This helped defuse a potential conflict regarding noise issues.

Next the management believed that the higher the noise level was, the more serious the complaints would be. It actually turned out to be the opposite with the higher sound levels traducing verbal exchanges between workers.

Observations of the situation did point out to a neighbouring problem, with small territorial conflicts between services that eventually required the use of noise barriers much more as a border marker than as a noise reduction device.

REFERENCES

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4 "ISO3382-3 Acoustics - Measurement of room acoustic parameters Open plan offices", ISO, Geneva 2012

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