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OFFICE ENVIRONMENT DESIGN: AN ASSESSMENT OF EFFICIENCY

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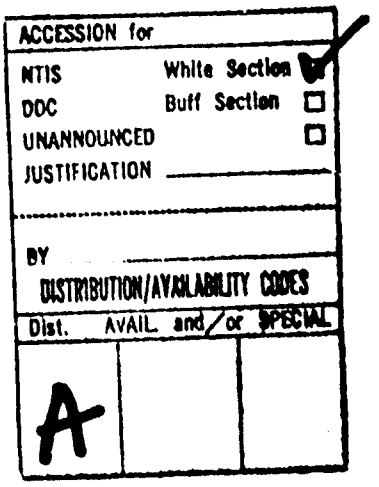

Abstract

This Technical Communication reviews the results of several research studies with respect to the attitudes of office users toward the 'landscaped', open office concept, or Bürolandschaft, and advances a general conclusion concerning the functional efficiency of landscaped offices. It is generally concluded that 'space planning' for complex office environments requires an integrated, total system approach in which specification of user requirements and performance criteria is given first and high priority. It is also concluded that the claims of the landscaped office protagonists for office productivity have not been substantiated. The landscaped office looks better but is judged to function no better than conventional offices. The data reviewed in this Communication strongly suggest that the implementation of landscaped office environments will result in loss of visual and acoustic privacy, particularly with respect to employees engaged in complex cognitive tasks.

Introduction:

The objectives of this Technical Communication are :

(a) to describe the office environment design spectrum, particularly with respect to conventional, closed offices and to `landscaped', open offices;

(b) to review the results of several studies of landscaped open offices; and,

(c) to develop a general conclusion about the efficiency of landscaped office environments.

Open and closed office environments are opposite ends of the office environment design spectrum. The office environment at DCIEM , for instance, is defined as a closed office environment in which most employees have a stable, well defined and private territory demarcated by walls on a rectilinear floor plan. In general, one person occupies each office.

At the other end of the spectrum are `landscaped' open offices. These offices are based on the concept of Büro-landschaft (the Office Landscape) innovated by a West German furniture manufacturer in the late 1950's and early 1960's. The traditional design of `long-corridor, cubicle, fixed-wall row of small private offices, together with bull pens of rows of desks in clerical areas' is replaced with scattered work groups in a large open office plan with the geometry of the plan reflecting the pattern of work amongst the groups rather than being a superimposed rectilinear grid frequently unrelated to traffic or information flow. The office is enhanced with plants which is the now old concept of `bringing the outside in' (1). `The assumption is that the office is primarily an information processing centre and that office architecture directly affects the efficiency of that processing.' (2)

Most offices, however, lie somewhere between these end-points, and can be called `hybrid' office designs. Work groups may be laid out in rectilinear or non-rectilinear plans in open spaces separated by so-called acoustic panels ,but supervisory and management personnel are assigned closed or semi-closed offices which offer more visual and acoustic privacy.

A number of significant claims have been voiced by the protagonists of the landscaped office environment concept, or Büro-landschaft. For example, 40-50% reduction in space requirements, 20% decrease in maintenance costs, 95% reduction in setup and renovation times, 10-20% increase in staff productivity, and improved staff morale and decreased absenteeism (1). The psychosocial benefits have been described in numerous ways ranging from a `decrease in rivalry and increase in cooperation' to

the 'removal of group ego' (2), each of which is said to result in increased employee productivity.

Since the office environments in many federal government buildings appear to follow very closely in many respects the principles of Bürolandschaft, it is interesting and reasonable to attempt to determine whether the claims of the landscaped office protagonists have any basis in fact.

Relevant Studies:

The number of empirical research studies carried out in the area of office environment design is very limited. The important findings and conclusion of several of these studies are outlined in the following paragraphs.

Nemecek and Grandjean (1973) undertook an ergonomic investigation of 15 large office spaces in Switzerland. Part of their investigation involved a questionnaire survey of user attitudes towards landscaped offices. 519 employees, 15% of whom were department managers, 55% of whom were 'special experts', and 19% of whom were 'team leaders', were asked to assess the advantages and disadvantages of their office environments. The predominant advantages were 'better communication' (40%) and improvement in 'personal contacts' (28%). The predominant disadvantages were 'disturbances in concentration' (69%), 'confidential conversations impossible' and 'no privacy' (17%). The most frequently mentioned causes of distractions were 'acoustical irritations' (70%) - conversations, telephones ringing, and office machines clattering. Interestingly enough, the data from this study showed no correlation whatsoever between noise intensity and frequency of complaints. Rather, it was the information content of extraneous messages that proved so distracting to the users of these offices. Conversely, 69% of respondents judged the 'course of work' in the landscaped office to be easier and more practical. 59% would accept another job in a large office environment other things being equal, while 37% would prefer a conventional enclosed office environment.

The authors clearly and carefully conclude from these data that 'in Switzerland the advantages of the large-space office outweigh the disadvantages for the majority of those concerned' and that 'negative attitudes of some of the personnel are to be expected.'

It is felt that the conclusions of this paper are somewhat too general and too optimistic. For example, 3 out of 4 'special experts' complained of disturbances in concentration in open offices. Furthermore, the percentage of managers complaining about a lack of confidentiality (24%) exceeds the overall percentage of respondents complaining about a lack of confidentiality by a factor of two. Furthermore, a significantly large percentage of those surveyed (37%) would prefer a conventional

office environment. Quite clearly, the performance of the landscaped offices surveyed by this study is far from satisfactory.

Weltz (1966 and summarized in Ref.2), in a similar attitudinal study of 101 West Germans working in a landscaped office, obtained a result completely at odds with the results presented in para. 5. Sixty-nine percent of respondents would reject the landscaped office while 29% would prefer it. Nemecek and Grandjean point out that the meaning of this difference is difficult to interpret due to differences in the groups studied and in their orking conditions. The pattern of advantages and disadvantages of open office environments, however, is very similar to that found by Nemecek and Grandjean. Frequently mentioned advantages were improved work flow and increased cooperation. The most frequently mentioned disadvantages were noise, distraction and lighting.

Brooks and Kaplan (1972) carried out a questionnaire survey of attitudes toward office environments for a major US retail firm. 120 employees, ranging from vice-presidents to clerical staff, were asked to assess office function, privacy, sociability, aesthetics, and geometrics (ie., the degree of `angularity' of the environment - see also Ref. 5 for a discussion of geometrics and user attitudes) both before and 9 months after moving from a rectilinear, hybrid, open office to a landscaped open office. Each employee was also asked to to indicate the ideal characteristics that the new office should have. According to the data provided by the questionnaires the new office should have been more functional with less noise and more privacy than the old office while also being more sociable, more aesthetically pleasing, and less angular. In actual fact, the new office, designed according to Bürolandschaft principles,was more aesthetically pleasing, sociable, and less angular. However, it was also perceived as more noisy, much less private, too open, and most importantly, much less functional. Acoustic privacy was judged to be worse in the landscaped office even though actual noise intensity levels were less than those in the old office. What the designers had failed to realize was that the lowering of noise levels through the use of acoustic panels and other physical design means can sometimes exacerbate rather than ameliorate the privacy problem because, although the intensity level of speech from adjacent offices decreases, the signal-to- noise ratio increases thus making these speech messages even more intelligible and , therefore, a greater source of interference or distraction. Again, there is little doubt that it is the information content of extraneous messages that proves so distracting to open office users.

Zeitlin (1966 and summarized in Ref. 2), in a study undertaken for a US government department on the effectiveness of landscaped offices, concluded that his study `failed to indicate

advantages inherent in the office landscape concept which could not have been obtained by providing an equivalent physical design environment in a conventional office of good design.' In fact, a large number of employees perceived a loss of 'efficiency' in the landscaped office.

Closer to home, a recent study of federal government offices undertaken in 1977 by the Secretariat of the Treasury Board of Canada found many problems with the performance of both open and closed office environments as they presently exist. These problems include lack of speech privacy, confusing layout of work groups, inadequate and conflicting symbols and signs, and conflicting images provided by the offices themselves and the government's words and actions regarding the frugality in the use of public funds (3). The main factors identified as problem sources were:

(1) The system for providing, managing, and administering the work environment is clearly inadequate;

(2) The system for establishing and documenting user requirements is clearly inadequate;

(3) Training of accommodation personnel in specification of user requirements is lacking; and

(4) Performance criteria based upon user requirements and necessary for office environment evaluation are non-existent.

In this study, 22 accommodation managers were asked to generate lists of 'perceived difficulties' in offices under their control. Then a team consisting of personnel from the Building Design Performance Division of the department of Public Works and from the consulting firm TEAG (The Environmental Analysis Group) evaluated the perceived difficulties 'in the context of physical reality' (which presumably means in the offices involved in the study). Many of the perceived difficulties were judged to be real problems of significance. With respect to the open offices surveyed the major problems were visual and acoustic privacy. Lack of visual and acoustic privacy was considered to reduce task performance, especially the performance of complex tasks requiring sustained attention.

Davis and Irwin (1976) believe that 'people observe implicit rules about territorial control and privacy, analagous to the rules they observe.... where they live'. The places in the work environment are categorized by its users as individual territory, group territory, and general territory, and at the same time as primary and secondary territory for a particular individual. They conclude that 'stress and dissatisfaction with the work environment are reduced when the organization's rules for

symbols and cues, for fitting out and personalizing the territory, for control of territorial boundaries, and for frequency of change are consistent with the implicit social rules followed by the staff'.

It should be noted that none of the studies reviewed in this memorandum made use of objective measures of office employee performance. Each assessment was undertaken with the use of questionnaires and therefore was based upon opinion data. (Nemecek and Grandjean also took measures of several physical parameters - airflow, temperature, relative humidity.) Opinion data is very often quite useful but its use in assessing productivity is questionable. Objective measures of office productivity are highly desireable. TEAG (3) strongly suggests that such measures include indices of individual employee output, health, absenteeism, and job attitudes.

Discussion:

It is evident from the studies presented here that the 'landscaped' office environment does not satisfy the visual and acoustic privacy requirements of a significant proportion of office personnel. Since complex cognitive task performance is often degraded under conditions found in landscaped offices it is therefore very likely that personnel performing such tasks would be the most dissatisfied with landscaped offices. On the other hand, clerical tasks, many of which are simple, routine, and repetitive, would probably suffer least in office environments offering low visual and acoustic privacy. Therefore, it is not surprising that the fundamental claim for enhanced information processing promulgated by protagonists of the Büro-landschaft concept are somewhat questionable for office groups performing complex information processing tasks (ie., managers, engineers, scientists, lawyers, etc.)

The office environment is a complex system serving a number of functions for its users. These functions relate to office productivity, group cohesion and interaction, aesthetics, and environmental description (1). For this reason, assessment of any particular office environment requires the use of a multivariate performance measure. No single criterion of office environment performance should be used in isolation for evaluation purposes. The weightings of, and trade-offs between, the set of variables comprising the performance measure must depend on the particular requirements of each user group. It is quite reasonable to expect that the requirements of a group of clerical employees for, say, privacy, are different from those of a group of scientists or company executives. Thus, it is contingent upon office environment user groups and space planning design groups to work together using appropriate methods to determine just what the requirements of the various user groups are.

Space planning (ie., the process by which user requirements are transformed into an implementable office environment design) is an art, not a science. `...so rapid has been the change in the structure of business that any behavioural "science" of space design is in its infancy, and office design remains in the hands of designers and architects...' `Designers are in need of hard data in both the micro-and macrobehavioural problems of space planning.' `Space planning is a field with little rational basis for its designs, one sorely in need of human factors inputs' (1). The claims of space planning specialists with respect to the performance of `landscaped' open offices have not been met, especially in the area of office productivity.

Office designers should adopt an `integrated, total systems approach' (1,3) to space planning if the requirements and expectations of the users are to be satisfied. A comprehensive approach of this type does not yet exist and any group of specialists in office environment design would be hard-pressed to prove that their particular approach is an integrated, total systems approach. Further, these specialists would be unlikely to have strong and conclusive evidence to support claims of successful design performance.

One group of environmental design consultants states that the integrated, total systems approach must include `people, their management, their furniture and equipment, the building which should house and support their activities, and the facilities management' (3). It must also include a specification for the process to be used by designer in integrating this total set of components.

Conclusion:

It is generally concluded that space planning for complex office environments requires an integrated, total systems approach in which specification of user requirements and performance criteria is given first and high priority.

Insofar as open offices are concerned, it is concluded on the basis of the research results reviewed in this memorandum that the claims of the landscaped office protagonists for office productivity have not been substantiated. Indeed `the landscaped office looks better but is generally judged to work no better than the old conventional one' (2). The data strongly suggest that implementation of landscaped office designs will result in loss of privacy and increases in perceived noise.

Specifically with respect to privacy, it can be concluded: (a) that any office employee involved in performing complex problem-solving and decision-making functions requires an office environment offering visual and acoustic privacy at his or her primary workstation (This requirement is not satisfied by the

provision of small, enclosed spaces each of which can be occupied by only one person at a time but which is shared amongst many employees.) and (b) that many clerical tasks, while not perhaps enhanced by lack of visual and acoustic privacy, are not significantly degraded either and, therfore, employees performing such tasks do not necessarily need private or semi-private primary territories.

Finally, solutions to the problem of office privacy do not automatically lie in the implementation of conventional closed or even so-called semi-private office spaces, but in the provision of means of controlling both visual and acoustic privacy. (Attempts have been made in existing landscaped offices to control acoustic privacy by providing sources of `white' or `pink' masking noise which are supposed to reduce the intelligibility of speech from adjacent offices. See para. 7. The effectiveness of masking noise in this case is not published in the literature.) The office of the future will no doubt offer various degrees of privacy under the control of the occupant.

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