

A Case Study on Human Factors Approach to Designing the Executive Office in the Insurance Company

사례조사법을 이용한 보험회사 사장실 디자인의 인간공학적 접근

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요 약

사람들은 대부분의 시간을 집이나 직장에서 보내게 된다. 그러므로 집과 사무실은 삶에 있어서 가장 중요한 두 개의 공간인 것이다. 인간공학적으로 디자인된 사무실은 그곳에서 일하는 사람들의 신체적, 사회적 요구에 부합하게 되어 작업능률과 만족감을 향상시키며, 스트레스를 조절하고, 건강과 안전을 위협하는 요소를 최소화한다. 특히 많은 책임과 권한을 가진 사장들에게 있어서 인간공학적으로 디자인된 환경은 필수적인 요건이 될 것이다. 본 연구는 사례조사법을 이용하여 미국 Iowa주 주도인 Des Moines에 사무실을 갖고있는 10개 보험회사 사장들을 대상으로 설문지와 관찰조사 및 실내공간 스케치를 이용하였다. 대부분의 사무실은 직접적으로 일과 관련된 디자인 부분만 강조되어 있었으며 그들의 많은 시간이 읽기와 쓰기등 시각적인 일에 쓰여지고 있음에도 불구하고 조명, 특히 국부조명은 거의 고려되어 있지 않았다. 상담이나 접견과 같은 활동을 위한 가구의 선택이나 실내공간계획이 제대로 되어 있지 않았다. 사용후 평가를 실시한 결과 대부분의 대상자들은 심리적, 생물학적 요구사항들에 대해 긍정적인 평가를 하였다. 디자이너는 좀더 사용자 위주의 공간계획을 해 나가야 할 것이며 각각 다른 사무실특성, 기능, 인간관계, 특히 종업원과의 관계, 사업종류 등을 명확히 이해해야 할 것이다.

I. Introduction

The work or office environment becomes a primary concern for those interested in

a human factors approach toward design.

An ergonomically designed office supports the physical and social needs of the people working in that office. The goals of such design are to improve human performance and satisfaction, control stress, and minimize health and safety risks (Koffler, 1986).

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People spend most of their time at home or at work. The house(or apartment) and the office(or workplace) are therefore the two environments that play the most significant role in people's lives. Yet, in our time, houses and offices are almost universally void of real vitality.

Among the many factors that must be considered by the designer when planning for the humanization of the office, the following are especially important (Brandt, 1987; Evans-Correia, 1988; Schirn, 1987):

1. number of persons employed in the office and levels of efficiency of each work;
2. number of activities;
3. amount of time spent in the office; and
4. costs related to design and equipment.

According to Sraeel (1989), in designing corporate space for the 90s, facility managers and space planners face the challenge of synthesizing interior aesthetics, office automation, and human needs to achieve an efficient business environment. The activities of a typical risk manager, the insurance executive, encompass a wide range of responsibilities and authorities. The scope of a risk manager's job includes risk identification, risk measurement, risk treatment, and technical implementation (Bickelhaupt & Bickelhaupt, 1986).

The length of time spent at work in the office becomes another important reason for directing the researcher's attention towards executive office design. The time spent in the executive office by risk manager requires a careful examination of the impact of this environment upon the attitudes and feelings of the individual.

The cost involved in designing office

space has become a significant factor in determining what is essential for worker productivity and satisfaction. According to Keller (1986), office furniture industry projects will have spent over \$12 billion on executive work stations by 1992. Many organizations will spend thousands of dollars on office furniture and equipment, with little or no thought given to ergonomic factors. The question then becomes this: if American businesses are spending so much money to create an effective office environment, what are they getting for their money, and why do so many of these offices not work? (Evans-Correia, 1988).

The present study has been designed to achieve the following objectives:

1. to determine the human factors critical to humanizing office design to promote task performance.
2. to determine the activity requirements related to specified human factors;
3. to determine the human factors critical to design for meeting psychological needs; and
4. to determine the human factors critical to design for meeting biological needs.

II. Literature Review

1. Office environment and productivity

The effect of environment on productivity is difficult to measure, but office designers agree that a healthy, comfortable worker is more productive than one with ailments attributable to a poorly designed office environments (Lexington, 1989). Designers who pay attention to such simple details as the seating, glare, and computer workstations can help reduce employee absen-

teism, health risks, and injuries, keeping people happy, comfortable, and safe (Evans-Correia, 1988; Hicinbothem, 1987).

In Steelcase and Louis Harris survey (1979), an impressive 92 percent of respondents see a direct relationship between environment and performance. Seventy-four percent feel that they could do more work in a day if working conditions and environment improved. To obtain an overview of the nature of productivity, activities, environmental control, furnishings and equipment are considered in the present study.

① Activities

The activities performed by the executives influence the design of the space and equipment in his or her office. According to Bickelhaupt and Bickelhaupt (1986), executives spend an average of 47 hours per week at their job. The activities they occupy most of the time are attending meetings, reading, and writing. One-fourth, or 25 percent, of their time is spent in meetings, and 20 percent in activities involving reading and writing. Telephoning took up 15 percent of their time. Other less than time-consuming activities included working with the secretary (8%), observing tours (7%), thinking (5%), and taking personal breaks (3%). More than half of the time was spent in face to face meetings. House and Napier (1989) state that typically, top executives focused on meetings with subordinates and on using interpersonal skills in accomplishing executive tasks.

② Environmental control

Environmental control in the office is related to lighting, temperature, air quality, and noise. Too much or too little of these items will usually have adverse effects on

a worker's health and productivity (Shell et al., 1985).

Research on lighting emphasizes the effects of its control and design on performance and satisfaction. According to the IES Lighting Handbook (1981), the purpose of office lighting is to promote effective visual performance with optimal use of energy. Proper lighting or the effective balance of indirect illumination and direct task-light fixtures is a major contributing factor to productivity (Whitehouse, 1988).

Lighting system flexibility for private offices can be obtained either by switching off alternate rows of lamps in luminaires or by dimming, thereby providing several illuminance levels. Moreover, floor or table lamps strategically placed can provide a relaxing conversation area, adding warmth and pleasantness to the space (IES Lighting Handbook, 1981).

People are becoming increasingly aware that they can and should demand some degree of oral and aural privacy and that they should not have to be annoyed or distracted by other people in the office. Caravanaugh et al. (1962) suggest that one of the most bothersome sounds in offices, particularly private offices, is the presence of speech that intrudes through the walls from adjacent rooms. When such speech is present, the occupants feel the privacy of their own speech is lacking. These investigators further believe that it is the degree to which the intruding speech can be understood, rather than its intensity level or loudness, that destroys the feeling of office privacy. Such noises create stress and fatigue.

Makley (1985) discusses the effects of poor acoustics and how they may affect

three major components of the office environment, namely productivity, employee well-being, and confidentiality. For most spaces, desirable sounds can be accommodated for by controlling noise and by treating surfaces with a mixture of sound-reflective and sound-absorptive materials. Solutions include floor and ceiling coverings, and masking sounds to lower noise levels and to promote privacy.

One of the most common, but not necessarily the most serious, topics of complaint in all types of offices is the thermal environment. Six factors are involved in thermal comfort: air temperature, radiant temperature, relative humidity, air velocity, metabolic work rate, and clothing. The first four environmental factors usually are under control of heating and ventilation systems or are a function of the building. Rarely do individual office workers have much control over those parameters (Pearce, 1987). Thermal comfort is not the "best temperature," but depends on the relation between the rates of heat production and dissipation. It is affected by ambient conditions such as temperature, humidity, and air motion, by the types and durations of activities people engage in, by the clothing they wear, and by their body types and sizes (Brill et al., 1984).

③ Furnishings and equipment

Office furniture is intended to produce places where people feel normal; where people feel themselves with all their human foibles, deficiencies, and oddities. The office furniture of the future will create an entirely different kind of human relation between worker and place from the one most workers experience today (Alexander et al., 1989).

Office furniture, specifically, as described by Brill et al. (1984), is

- designed to support tasks that must be performed by office workers:
- a symbol of status for the person assigned the furniture, communicating his /her status to others through the number, type, quality, age, and layout of the furniture:
- a cue to behavior, through suggesting, permitting, or forbidding certain activities:
- used as architectural elements in offices, organizing and defining space, e. g., putting filing cabinets in a row to act as a space divider; and
- an aesthetic element, giving delight through form, construction, materials, and finishes.

These characteristics contribute to making furniture an essential part of the design best responding to individual needs. Kroemer and Price (1982) state, designing a suitable work place is impossible if the components are treated as separate units. Rather, one must consider the interactions between task and environmental components and with and among the system elements.

They maintain that the human is the limiting and determining component of the work system. Therefore, primary design recommendations for the work place must be derived from human capabilities, limitations, dimensions, and preferences. The special components which must be studied in the office space are seating, work surface, storage and computer equipment.

2. Definition of psychological considerations and biological needs

Human factors involved the consideration of human beings in the design of man-

made objects, facilities, and environments that people 'use' in various aspects of their lives (McCormick & Sanders, 1987). Office environment is one area which has been receiving more attention by human factors specialists in evaluating the satisfaction of human needs. Among many factors important to design the offices, psychological and biological factors should be responded for activity requirements. The psychological factors are discussed in Table 1.

These descriptors are listed commonly as responses given by typical research test subjects who were asked to verbalize their reactions to architectural environmental features. In general, one should seek a more or less ground in trying to create a balanced combination of these factors.

The biological needs are addressed by Dietz et al. (1976). They are: physical safety and security, contact with nature, sunlight and other living beings, definition

of personal territory, relaxation of body and mind, orientation to space, adjustment of the biological clock, and focus on activity.

These psychological and biological factors listed are useful in considering the important factors playing a part in determining user reaction. More information about these factors will be discussed in detail in results and discussion part.

III. Methods

1. Adoption of case study method

According to Zeisel (1981), investigators use case studies to describe and diagnose single, internally complex objects such as individuals, buildings, episodes, institutions, processes, and societies. In case studies, investigators delineate boundaries of an object and observe such things as the elements it comprises the relations among

Table 1. Psychological considerations with semantic descriptors

Psychological Factors	Semantic Descriptors	
Spaciousness	Positive	generous, ample, empty
	Negative	cramped, limited, crowded
Friendliness	Positive	warm, intimate, relaxed
	Negative	cold, detached, stiff
Variety	Positive	stimulating, dynamic, diverse
	Negative	boring, static, monotonous
Utility	Positive	purposeful, efficient, practical
	Negative	unnecessary, confusing, frivolous
Rationality	Positive	organized, logical, simple
	Negative	uncoordinated, confusing, complex
Flexibility	Positive	adjustability, mobile, expandable
	Negative	constrained, fixed, contained
Accessibility	Positive	open direct, formal
	Negative	closed, indirect, casual
Security	Positive	familiar, safe, protected
	Negative	unknown, uncertain, and exposed
Appearance	Positive	graceful, contemporary, meaningful
	Negative	awkward, obsolete, obscure

source: Woodson (1981), p. 20

its elements, the development of the object, and contextual influences. Zeisel states further that the case study method is appropriate when researchers are primarily interested in the information specific to the study object and its context, rather in information generalizable to a large population. Therefore, the case study method was adopted to obtain indepth information and to gain a better understanding of the research problem.

2. Sample selection

The participants in the present study were selected from a list of executives of major insurance companies functioning throughout the United States, and particularly in Des Moines during December, 1990 and January, 1991. Respondents represented organizations and risk-management staffs of many sizes. The sample consisted of ten executives, their status levels were defined by the administrative officers of their organizations.

3. Instruments

Three different instruments were used to obtain data about the participant and the office environment. These instruments included a questionnaire, an observation checklist, and a sketch of the present office layout, instruments designed to elicit the information

The questionnaire consisted of five sections: ① demographic information, ② equipment and furnishings, ③ environmental control, ④ interacting with other people, and ⑤ post occupancy evaluation (POE). At the beginning of each section brief introduction was given for better understanding.

The post occupancy evaluation was

performed to assess executive preferences related to the office environment's relation to psychological considerations and biological needs. Twenty-three questions were developed and participants were asked to check Likert-type with 5 scales, i. e., strongly agree, agree, neutral, disagree, and strongly disagree.

The observation checklist was developed to evaluate equipment design and location, and office interior space with three scales, i. e., positive (P), medium (M), negative (N). If there are some remarks, researcher can note on each checklist.

Sketches of the present office layout included: ① the floor plan (window location, number of windows, furniture layout, and location of equipment), and ② the inter-relation of office task areas. To obtain timely the information about environmental control and space layout, the quick sketches were not scaled for accuracy. (see Figures 1- 10)

4. Data collection and analysis

Preliminary testing involved questionnaires were administered to two chairpersons of departments at Iowa State University. Upon completion of this stage, the final questionnaires were prepared for use by the ten executive officers. Contacts were made by telephone, and interviews were scheduled. All data were collected by one researcher because of small sample size and avoiding unnecessary researcher effect.

Frequencies, ranges, and averages were utilized for data analysis. Since this research adopted case study method, indepth information about each case was described. The quick sketches of the present office layout were drawn with computer graphic program.

IV. Results and Discussion

1. Demographic information

A close look at the demographic of a group of ten executive officers shows that four were 35 to 45 years old and that the rest were 45 years old or older. Six had been employed in top management for two to six years, and the remaining four had been employed in top management for fifteen years or more. A study of the design on their offices indicated that office characteristics did not reflect demographic factors as they were related to each human factor.

The executives had been in their present offices from only three months to as long as twenty years and nine months. Three had worked in their positions for more than five years, and seven for less than five years.

Participants spent much of their time

at work in their offices: four spent 40 hours or longer per week; five spent 20 to 40 hours per week; and only one spent less than 20 hours per week. The individual spending less than 20 hours per week in his office was required to share his time between two work locations.

The number of people employed at the specific sites ranges from fifty to fifteen hundred (50 - 1500). (see Table 2)

2. Activity performance

Activity performance is a critical factor in the design of the workplace. The author of Work station systems: Their importance grows (1986) points out that employers have begun to realize that better designed workplaces produce happier, healthier, and more productive employees. In the present study, the activities performed most frequently for longer periods of time were conferring,

Table 2. Demographic information on 10 cases

	Period of office design	Age	Education	Length of time in the office	Hours per week in the office	Length of time in position	Number of employees	Special interests
Case 1	1986 -1987	35-45	B.S.	2 yrs.	over 40	4 yrs. 6 mths.	75	music antiques
Case 2	1986-1987	over 45	B.S.	3 yrs. 6 mths.	20-30	5 yrs.	285	photo- graphy
Case 3	1989	over 45	B.S.	6 yrs.	20-30	2 yrs.	1100	none
Case 4	1987-1988	over 45	M.B.A.	15 yrs.	30-40	24 yrs.	70	reading
Case 5	1970	over 45	B.A.	20 yrs. 9 mths.	over 40	27 yrs. 9 mths.	1500	oil painting
Case 6	1988-1989	over 45	B.S.	1 yr. 2 mths.	over 40	5 yrs. 5 mths.	80	plants
Case 7	1990	over 45	B.S.	6 mths.	30-40	21 yrs. 3 mths.	50	small sculpture
Case 8	1990	35-45	2 yrs. in college	7 yrs. 2 mths.	30-40	10 yrs.	100	music hunting
Case 9	1990	35-45	B.S.	1 yr.	over 40	5 yrs. 7 mths.	190	music
Case 10	1988	35-45	B.A.	3 mths.	10-20	2 yrs. 2 mths.	120	agricultural miniature

reading, and writing. The ten offices in the insurance companies studied were designed for the performance of a minimal number of activities, and the time executives spent in these offices was generally devoted to business activities.

In a study of the activities performed by risk managers in their offices, time was distributed to meetings (23%), reading (19%), and dictating and writing (20%) (Bickelhaupt & Bickelhaupt, 1986). These three activities took up 50 percent of the work day (see Table 3.).

Table 3. Time distribution per work day

Activities	Range(%)	Average (%)
Meeting with the group	0-15	7.0
Conferring with one or two persons	10-35	23.5
Reading	0-35	18.0
Writing	5-20	10.5
Conferring with secretary	0-10	6.5
Recreation/personal break	0- 5	3.5
Thinking	0-15	7.0
Gathering information	0-10	7.0
Working with computer	0-10	4.5
Planning	0-20	10.0
Others	0-10	2.5

Investigation of work patterns showed that executives spent 10 to 40 hours or more per week in their offices. Half the group worked in the office either on weekends or one night during the week to take advantage of the quiet. Seven spent some time at work in an office at home.

3. Furnishings important for the performance of task

According to Woodson (1981), in designing or selecting furnishings, one of the most important considerations is "user

fit": that is, careful consideration should be given the dimensions and the anatomic characteristics of users to ensure that furniture fits them, supports them properly, and adjusts to their activities, that is, rest, work, and recreation. He states further that good furniture can be designed in any style as long as good human engineering comes first.

In the present study, the furnishings considered important for the performance of three activities (conferring, reading, and writing) were chairs, work surfaces, and storage. For meetings, three or four chairs were required in addition to the chair used at the desk by the executive officer. In all offices studied, the need for more chairs could be satisfied with two to seven chairs. Only one officer indicated that the existing arrangement was unsatisfactory. Seating for large numbers was usually accommodated in the conference room.

When participants were asked about changes they would prefer in the characteristics of their desk chairs (height, width, depth, armrest, and mobility), only one mentioned a change in depth. The researcher observed, however, that the desk chairs were of a similar design in all offices, having similar finish, style, size, and function. Moreover, each fit the anthropometric requirements of the officer.

For easy movement of the officers at their desks, chairs had been designed with casters and positioned on floor pads laid on smooth surfaces. And for greater comfort, chairs had been designed with adjustable seats and backs.

Furnishings associated with the writing activity included a primary work surface and a lighting system. The characteristics

of the work surface (height, leg room, amount of usable surface, and expansion features) were generally described as satisfactory by participants. In eight offices, work surfaces were part of the traditional large office desk, including storage features with five to eight built-in drawers.

To obtain greater efficiency, pull-out type expanded work surfaces were attached to either one side or both sides of the primary desk. Eight of the desks occupied the center of the space plan. Seven executives had selected the furnishings for their offices.

A type of furnishing necessary for the performance of executive officers was the storage unit. Brill et al. (1984) state that superb organization can make even the tiniest square footage extravagantly serviceable in large as well as in small places. The storage units observed included in the ten offices studied credenzas, wooden two-drawer files, bookcases, bookshelves, and storage in computer supporting cabinets. There was a need for additional storage unit within easy reach of participants. Many items were stacked on floors. The characteristics of these materials used in the insurance business were that the materials differed in size and quantity, and thus did not lend themselves to standardized units. From the researcher's perspective, storage units were well designed in terms of accessibility and usability.

Storage unit in the executive offices were incorporated into desks, credenzas, shelves, and bookcases. These furnishings were located around the perimeter of the room. Additional storage was also found in adjacent work areas.

Because of the type of written materials used in the insurance business, open storage could be used very efficiently to eliminate the need to store materials on the floor. Thus, great accessibility to materials could be achieved.

4. Lighting

According to research conducted by Czaja et al. (1987), the primary light source in most offices is general/ambient recessed fluorescent lighting in the ceiling. Indeed, the present study found that lighting in the ten offices was general/ambient recessed lighting. Nine of the offices studied were lighted by direct overall fluorescent ceiling lighting, and the last office was lighted from recessed incandescent sources in the ceiling. The amount of general lighting in the offices was considered satisfactory by nine of the officers.

Even though task lighting should be provided for predominantly visual activities such as using the computer, writing by hand or doing general reading, only one executive had a lamp on the desk provided for critical seeing tasks (see Figure 1). According to ten officers, whose responses were confirmed by the researcher's observation, none of the offices had appropriate general, task, or accent lighting. Nine of the executives did not have any lighting for specific tasks such as reading and writing, even though most of respondents' time was spent on these activities. In short, little, if any, attention had been paid quality and quantity of illumination in office design.

5. Human factors

In designing executive office spaces, it is critical to focus on meeting basic human needs to ensure comfort and

productivity in the office. Following are human factors, specifically pertaining to psychological considerations and to biological needs, that should be considered in evaluation of the quality of office environments of executive officers in risk-management positions.

(1) Psychological considerations

① Spaciousness

Based upon the findings of the present study, all participants agreed that their offices were sufficiently spacious. The color finishes in these offices were cool hues, light values, and low intensities. According to Faulkner and Faulkner (1975), these factors tend to heighten the sense of spaciousness. Other factors contributing to a sense of spaciousness are scale, quantity of furniture, and amount of floor area. From the researcher's point of view, the scale of the furnishings was appropriate in seven of the offices. In one office, the scale seemed inappropriate and the room was crowded because of the large dimensions of the conference table, chairs, and bookcase (see Figure 4). In contrast, a small amount of small-scale furnishings in a huge room made another office seem vast. Here, a built-in storage unit occupied one entire wall, and the desk looked isolated in the center of a huge floor area (see Figure 5). One office looked cramped because of the great quantity and inappropriate scale of furniture (see Figure 3).

② Variety

The impression of variety associated with optimal arousal was closely related to functional complexity, intensity, emotional impact, change, and scale. Executives achieved the impression of variety in their offices by displaying antiques, collections,

wall hangings, photographs, maps, and paintings. In general, the offices exhibited limited variety and thus were not considered very stimulating by the researcher. The spaces seemed static and monotonous.

③ Utility

Utility as a psychological concern was responded to positively by nine of the ten executive officers. The characteristics of efficiency, purposefulness, and practicality were demonstrated primarily by the types and the arrangements of furnishings.

The researcher observed that efficiency was associated with the spatial relation between one work area and another. Within the space, each component supported the others and assisted the executive in performing his/her tasks. Distinguishing characteristics of office design in the present study were the amount of supportive materials and the source of data used to analyze and interpret information found in stacks on floors and on top of furnishings appropriate for their activities. These materials seemed to be those that were used continually and thus needed to be accessible.

④ Friendliness

Nine of the executive officers described their spaces as warm and relaxed. To the researcher, none of the offices did in fact impact a feeling of friendliness. Quite the opposite, they all seemed cold and stiff. This effect was primarily caused by the types of lighting and furnishings. Fluorescent lighting and heavy black furnishings created a generally unfriendly atmosphere. The officers felt warm and relaxed even though the researcher seemed cold and stiff because the officers stayed in their offices for a long time and they may be accustomed to

their surroundings.

⑤ Rationality

In office design, rationality is achieved by an orderly use of space, storage for basic activities, ease of access to materials necessary for tasks, good organization of space activity, and overall arrangement in each area. Nine of the individuals responded with positive terms, and the last responded with neutral term. The researcher observed that spaces were designed in simple, organized, and logical arrangement.

⑥ Flexibility

Participants generally agreed that their office designs could not easily be adjusted and expanded to meet changing needs: furnishings were in a fixed and contained arrangement. The researcher's observations were in agreement with the responses of the executive officers because of the nature and the single purpose of the furnishings.

⑦ Accessibility

Accessibility in the executive offices is maximized by the effective organization of activities, with all parts of a space related effectively. The organization contributes to a neat space in which organized individuals can think and plan clearly, and work efficiently. The individual can also choose activities freely and resist potential interruptions successfully. It was observed that the design of the office spaces studied did allow for the kind of privacy essential to logical thought and action. These office spaces had the visual and acoustic privacy appropriate for efficient work. Responses of the executives to related questions were positive.

⑧ Security

Security in the executive offices studied was related to natural enclosures, comfort,

functional furniture, permanence, and safety. All executive officers agreed that the sense of security had been well achieved in the spaces they used. It was observed that color and mood related directly to the sense of security. This response may also be associated with the types of lighting and with the furnishings.

⑨ Appearance

All officers responded positively to this psychological consideration. Their responses may have been influenced by sensory experience, the meaning of certain design elements and arrangements, and the relation between designs for primary and for secondary purposes. From the researcher's perspective, aesthetics was less a consideration in the design of the space than was functionality. Lasting satisfaction from aesthetics is usually taken into consideration after basic human needs have been satisfied.

(2) Biological needs

① Survival, protection, and sustenance

People feel security by enclosure, warmth, color, personalization, and antiquarianism (Miller & Schlitt, 1985). In this study, all executives had enclosed spaces as their workplaces. Warmth/temperature was produced naturally by designing rooms to take advantage of the sun or artificially with equipment such as climate control devices. Nine offices had windows permitting the benefit of sunlight, and temperature was controlled either by thermostat or by central control. The researcher observed that all spaces looked safe and secure in terms of color selections.

All executives personalized their office spaces with their own collections, pictures, and other accessories such as plants,

memorabilia, and music systems. One individual displayed an antique table and dictionary in his office because "old things in general can add to our feelings of permanence and security" (Miller & Schlitt, 1985, p.75) (see Figure 1). All executives felt safe and secure in their offices.

② Contact with nature, sunlight, and other living beings

There is some experimental evidence to indicate that people consistently prefer pictures of natural settings to those of built environments (Kaplan et al., 1972). In the present study, contact with nature, sunlight, and other living beings was achieved by windows admitting natural light. In terms of natural materials, the often-mentioned preference for wood was demonstrated in the furnishings of these executive offices. Natural colors of flowers, plants, and other natural materials can also provide people a tangible contact with nature. Plants were a popular item in four of the offices. Number of plants ranged one to three.

In this study, seven of the individuals expressed satisfaction regarding contact with nature through their windows. One executive expressed a neutral view, stating that he was not interested in the views from the windows (see Figure 1). Those who expressed dissatisfaction did so because of the lack of interest in views from the windows or because of the lack of interesting views from the windows. The officer who responded negatively did not have any windows in his office (see Figure 10).

③ Definition of personal territory

Brill et al. (1984) stated that "personalization serves to articulate and reinforce individual and group identity, and symbolizes

the claim to territory by a particular person or group. It makes environments more stimulating, makes of them communication mechanisms and helps develop environmental competence and mastery, both of which are components of personal growth and development" (p. 253).

In the present study, the researcher assumed that the executives personalized their spaces according to their own interests - music, paintings, sculptures, photographs, memorabilia, and antiques; for example, three officers had their own music systems in their workplaces and turned it on all day long as a background sound. They turned them off when there was need for a high degree of privacy.

Another way of personalizing the space is to decorate the room with art work such as paintings and sculpture. Number of offices in which this occurred ranged from one to five. In terms of territoriality, executives expressed satisfaction with the accessories in their offices.

For environmental psychologists Stokols and Altman (1975), a key feature of human territoriality is the individual's (or group's) control over a space. In terms of control over the environment (lighting, ventilation, humidity, and temperature), most officers responded positively although one responded negatively. The researcher observed that lighting could be controlled only by turning toggle switches on and off and that there were no dimmer systems in the offices. Sunlight was controlled with adjustable curtains and blinds. Temperature could be controlled by a thermostat in the office.

④ Relaxation of body and mind

In the design of relaxing environments, as opposed to boring and monotonous en-

vironments, the following qualities are essential (Miller & Schlitt, 1985, pp. 114-115):

- simplicity: simple decor, few embellished items, spacious rooms, uncluttered lines, closely related colors, and textures, and homogeneous lighting.
- low intensity: cool colors, muted shades, low illumination levels, soft lighting, soft edges in furnishings, and low levels of sensory stimulation.
- predictability: static objects, unifying themes, matching-design elements, symmetrical arrangements, and open-plan design.
- familiarity: conventional designs and styles, standard products, antiques, and heirlooms.

In this study, all executives considered their office spaces relaxed. The feeling of relaxation was contributed to by soft-fabric upholstered sofas, predictable furniture layout—that is, a symmetrical arrangement, and low level of illumination.

The office with triangular floor plan was considered the least relaxing because it was not predictable and familiar, and its furnishings were arranged asymmetrically.

⑤ Orientation to space

Design techniques make it possible to increase usable floor space while providing adequate seating and allow people to regulate interpersonal distances and thus avoid spatial problems. Participants' responses regarding space orientation were positive. The officers indicated that they could work easily within their spaces and that items were easily accessible to them. The researcher's observation confirmed the executives' responses.

⑥ Adjustment of the biological clock

Becker (1981) stated that the design and furnishings of a setting can directly contribute to time orientation. Antiques direct us backward, whereas computers focus our attention forward. People derive pleasure from viewing nature, partly because of the welcome change in seasons (Miller & Schlitt, 1985). From their windows, people can directly experience time, weather, and other environmental and social events.

In the present study, nine out of ten officers had windows contributing to an effective time orientation. These participants expressed high degrees of satisfaction with this characteristics of their spaces.

⑦ Focus on activities

The biological need for people to be focused on activity is essential for a high level of productivity and stimulation. A variety of activities takes place in the office. Responses from the participants in this regard were positive. The researcher observed that spaces were successfully designed to enhance the occupants' focus on activities. Furniture layout was carefully considered for work-flow pattern, and furnishings were located within arm reach.

V. Recommendations for Further Study

Designing the executive office for an individual employed in a business such as insurance presents an unusual challenge to the designer. The myth that such an executive is primarily concerned with the status or image projected by the environment has not been supported by the present study. The ten officers studied were highly motivated, efficiency-driven, and focused on

the primary goals of their company. Observation of the cases confirmed that the officers responded to each aspect of design in terms of their objectives in this risk-taking business.

1. There is a critical need for the designer to gain a clear understanding of the characteristics of different office designs, types as related to function, classes as associated with numbers of employees, and types of services offered by each type of office.

2. There is a critical need to study the activities of executive officers and to determine their attitudes towards their own performance. The ten officers studied were fully oriented to the work of the profession. All were concerned with the minimal essentials of office design. This did not focus on any aspect of design not directly related to the quality of their work.

3. The designer needs to determine how the executive officer related to each component of the design. The participants were not interested in the aesthetics or in the various dimensions of the mechanical systems. No office was concerned with quality or quantity of lighting as a significant factor related to seeing.

4. The designer needs to recognize his or her role as an educator who can help executive officers understand the importance of significant components such as lighting.

5. The designer must recognize the importance of working with the client in space planning and in selecting the furnishings to be used in the space. The type of activity performed in the spaces studied required large work surface areas to accommodate large references and papers. Such surfaces were not easily

accessible to individuals with either small or traditional office desks. This finding is the result of observing officers who had selected desks with large work surfaces adequate for their activities.

6. The designer needs to understand the role of technology in assisting officers with their activities. In this study, technology played a very insignificant role as a primary component associated with their activities. The man-machine relationship was minimized as an interaction occurring only when computer printouts were checked for interpretation. The production of printouts was the responsibility of specialized employees. The present study revealed that the activities of executive officers were dependent upon the use of technology (computer) by specially educated and trained employees. Thus, support services were critical to the performance of executive officers. The quality of the technology needs is critical to this level of employees.

7. The designer needs to understand the role of support services in each activity. Support services are primarily performed with the help of the computer and its major components. Activities of the insurance business are highly decentralized and performed at many levels throughout the company.

8. The designer needs to understand the psychological considerations and biological needs related to this type of design:

(1) Psychological considerations

① In the present study, the psychological considerations responded positively were spaciousness (generous, ample, and empty), utility (purposeful, efficient, and practical), rationality (logical, simple, and organized), accessibility (open, direct, and formal), and

security (familiar, safe, and protected).

② Those considerations responded to less positively were lack of the following: variety (boring, static, and monotonous), friendliness (cold, detached, and stiff), flexibility (constrained, fixed, and contained), and appearance (awkward, obsolete, and obscure).

(2) Biological needs

① In the present study, the biological needs responded to positively were survival, protection, and sustenance; contact with nature, sunlight, and other living beings; orientation to space; adjustment of the biological clock; and focus on activities.

② Those needs responded to less effectively were definition of personal territory and relaxation of body and mind.

9. The designer needs to have a better understanding of the user-oriented conceptual planning process. According to Woodson (1981), this process starts with the user, as one who recognizes human characteristics and constraints. This step is followed by determining user needs and then creating space in which the user can perform whatever task he or she is expected to. From a human factors point of view, the primary focus should be proper planning to meet user needs. In conceptualizing the design "from the human-out," the following steps should be taken in a human factors approach:

Step 1. define and examine the needs of the total user population:

Step 2. examine and define the various tasks that each user has to perform:

Step 3. explore the interaction as well as the isolation needs of the various users, and their furnishings and equipment:

and

Step 4. create an enclosure for the most effective alternative defined in Step 3.

With each of these steps, ergonomics /human factors are of primary concern. After these steps have been taken, the designer is ready to examine the concept in terms of aesthetic features. By this approach that is, the human factors approach - user efficiency essential to the eventual effectiveness of the design. Practically speaking, aesthetic and user-efficiency considerations complement each other to create a high quality work environment.

10. The designer needs to have clearly stated criteria giving direction to a human factors approach in the design of a successful executive office. In the present study, the researcher observed that the most successful office design focused on the features essential to the primary activity - conferring with one or two persons. Desks and chairs were appropriate furniture for the user and for the activity. The researcher observed that none of the ten offices studied would be considered desirable workspace from a human factors perspective.

11. In future studies, there is a need for focusing on:

① representative sample of offices to determine dominant trends of spaces:

② advantages and disadvantages of different types of offices for different types of activities:

③ a broad range of human factors regarding office design for executives (these factors would include user population, user efficiency, socio-cultural variables, perceptual quality, and anthropometrics).

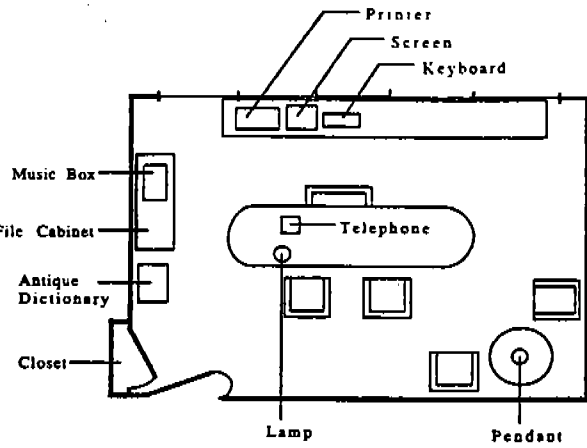


Figure 1. Space plan for executive office 1

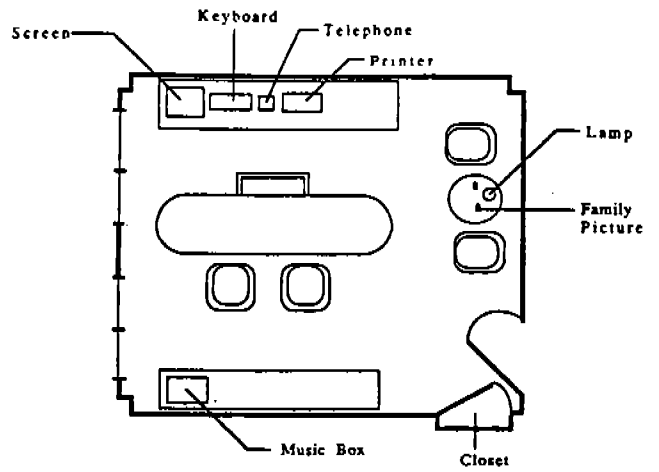


Figure 2. Space plan for executive office 2

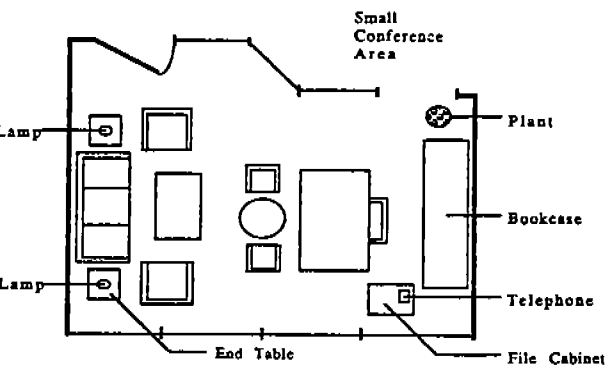


Figure 3. Space plan for executive office 3

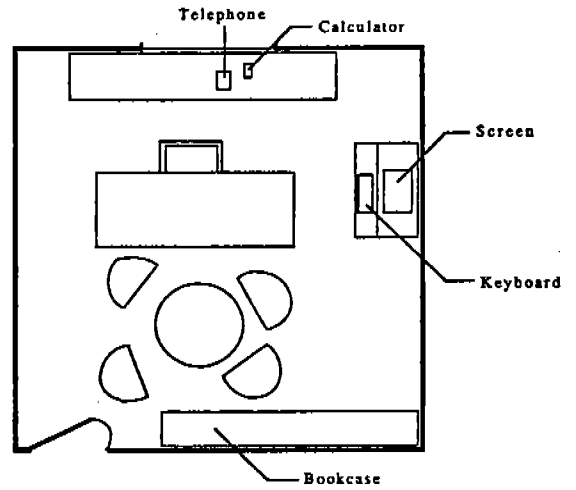


Figure 4. Space plan for executive office 4

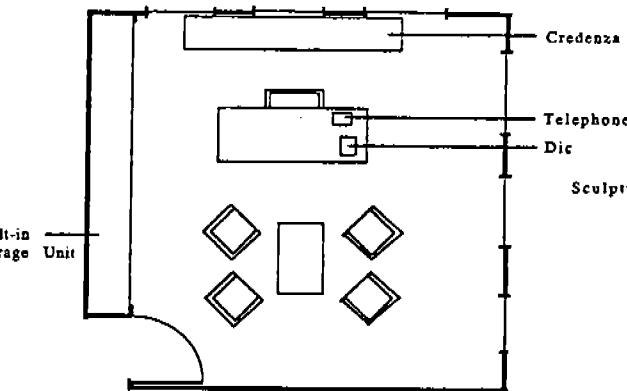


Figure 5. Space plan for executive office 5

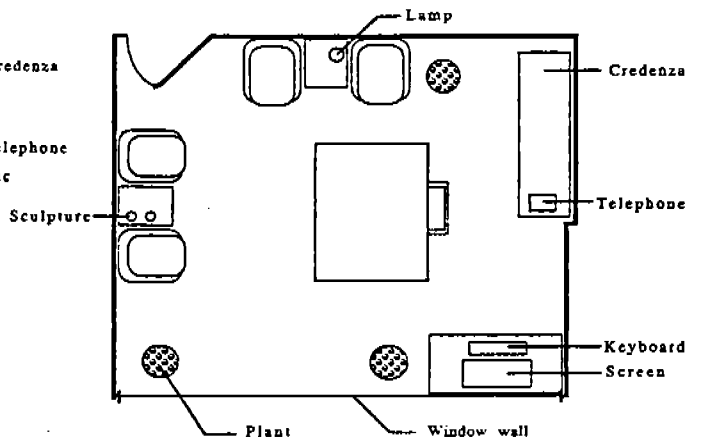


Figure 6. Space plan for executive office 6

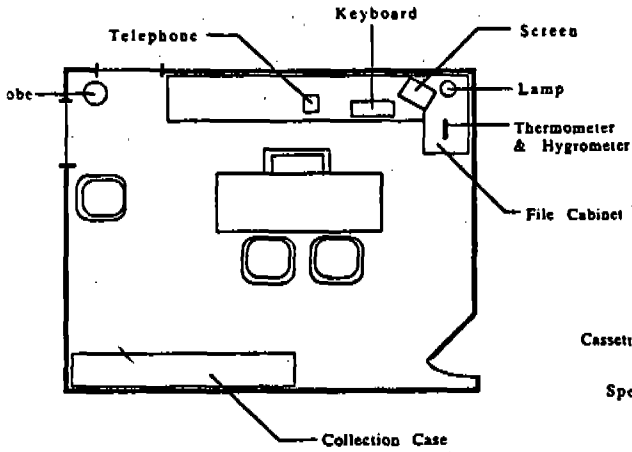


Figure 7. Space plan for executive office 7

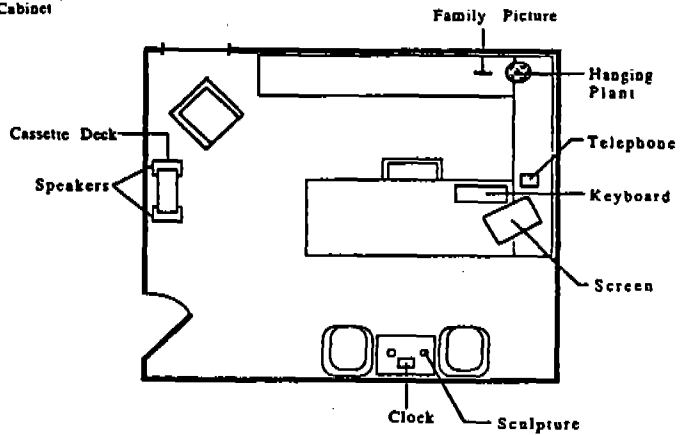


Figure 8. Space Plan for executive office 8

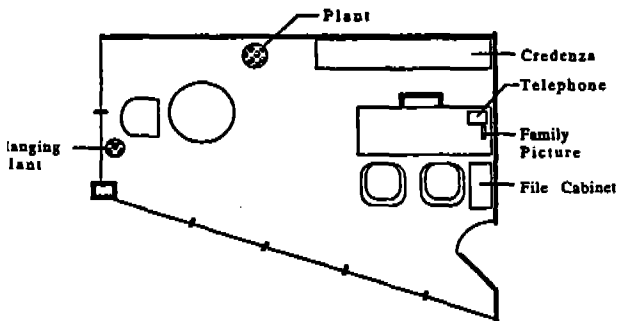


Figure 9. Space plan for executive office 9

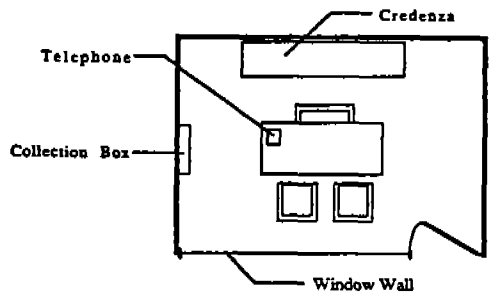


Figure 10. Space plan for executive office 10

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