

The Role of Design Characteristics in Enhancing Sense of Coherence in Workplace Environments: A Case Study of University of Mosul Buildings



Nihaya M. Younus*, Ghada M. Younis^{ORCID}

Department of Architecture, College of Engineering, University of Mosul, Mosul 41002, Iraq

Corresponding Author Email: ghadayounis@uomosul.edu.iq

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ABSTRACT

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The study of design characteristics in built environments is a critical aspect of promoting human health, as individuals spend a considerable portion of their lives in these settings. As built environments significantly influence individual and societal well-being, it is imperative to prioritize health-supportive features. Integrating a salutogenic approach into the design process is essential for fostering healthy communities. The health-promoting design emphasizes the origins of health, exploring factors that enhance health rather than merely addressing disease treatment or prevention. In contrast to the traditional disease-focused approach, this study emphasizes factors that support health promotion and encourage individuals or societies to develop a heightened sense of health, well-being, and improved quality of life amidst rapid urbanization. Environmental factors contributing to stress, tension, and various health issues can lead to detrimental changes in individuals' lives. This research investigates the impact of workplace environments on overall health and, specifically, workers' mental health by evaluating the influence of design characteristics on the Sense of Coherence (SOC). By examining the structural composition of spaces that facilitate social interaction and gatherings, this study aims to understand how these spaces can enhance psychological well-being through increased social engagement. The findings contribute to the development of evidence-based design strategies for creating health-promoting built environments in workplace settings.

1. INTRODUCTION

This study emerges from the crystallization of the most important health challenges facing individuals in their life practices for the workplace environment, which are based on the concepts of health-supportive design. The concept of harmonization between employee and place of work, which indicates compatibility of environmental properties of the workplace with the needs of the subjective individual (any existence relative to requirements of the environment and environmental resources), explains the growing recognition among researchers in the workplace regarding [1]. Man has distanced himself from nature in recent decades due to technological and informational development and rapid population growth, as individuals spend most of their day in closed and neutral indoor environments that rarely support the self-cohesion processes of the occupants. Sense of Coherence (SOC), and many children spend less time outdoors than their parents did as children [2].

The living environment with its characteristics and capabilities has a great influence on the overall mechanisms of improvement and recovery, even for ordinary individuals, as individuals actually spend about 90% of their day indoors, and instead of adopting the characteristic of diversity and innovation in building designs, the design of spaces is usually directed to other factors such as performance, efficiency, and cost, so the design must take into account awareness of the space users' health support and needs. What is often

overlooked is the extent to which the living environment affects mood, health, and behavior, as it can have a positive impact through assistance and support in imparting factors of improvement, restoration, and recovery. What is important here is to understand how the environment can negatively affect us. This may be evident through many side effects, such as increased depression, use of pain relievers, and prolongation of recovery time.

The objective of the study first is: to develop awareness among architects, as designers of living environments, that they bear a great responsibility in all choices made in the designs of interior environments, as materials, lighting, shapes, and colors all affect individuals in shaping their spatial practice [3], as well as identifying the most important features and characteristics through which support and resources that promote mental health are achieved. Secondly, the primary function of design that supports health, physically or psychologically, is to start as a mental process that may occur by finding factors that attract the individual's attention when using the internal environment, or at least reduce the severity of anxiety that they may be exposed to and bring about positive psychological changes over the period of living and sensory experience of space. Defined from a salutogenic perspective, the design not only reduces or eliminates the causes of stress but offers properties that develop awareness and sensitivity to healing factors that promote healthy processes. One of the most important challenges of the psychological approach is the

psychologically supportive design of our minds to create pleasure, stimulation, creativity, satisfaction, renewal, and admiration [4]. There are three design strategies of healing design: 1) *supporting strategies* that use specific elements to reinforce physical health, vital life energy, and psychological well-being; 2) *balancing strategies* that are oriented toward harmonizing those elements; and 3) *nourishing strategies* that address emotions, spiritual life, and the soul [5].

This health-supportive approach is based on foundations and principles that achieve many mental health factors, including self-coherence. Psychosocial studies of the office workplace environment show that not knowing what others are doing may cause fears and forms of negative behavior and thus generate a lack of self-coherence, as each office enjoys a space of expression and social impression, which may be constructive or destructive, and is greatly affected by the physical visual impression provided by the space of the work office. One of the important references for generating positive expressions of the office work environment and the most interactive is the renewed social structure that supports the characteristics of the place. This concept works to develop social relations that build mutual trust between the work team and achieve higher performance, as the whole team becomes a vibrant community of individuals who work with a tangible sense of belonging and active participation [6]. The purpose of the study is to understand how these spaces can promote mental health recovery by increasing social engagement. The findings contribute to the development of evidence-based design strategies for creating healthy built environments in the workplace.

Research problem: the impact of the structural characteristics of the internal spaces of the office buildings that support the formation of axes and spaces that provide points of convergence or interface that enhance social interaction between users to achieve self-coherence of individuals.

2. SALUTOGENIC DESIGN

The base of the word salutogenic comes from the Latin words *saluto* which means health and *genesis* meaning origin [7]. Psychologically Supportive Design (PSD) [4], means the environment must be designed concerning the mind healing status [8]. As the salutogenic approach is based on establishing a direct link between the language of architectural design and environmental psychology [9]. This approach emerges in general. The mechanism of balance between two parallel but contradictory health and disease operations - the operation of health seeks physical and psychological health factors firstly, and the pathogenic operation seeks the origin of disease and causes itself secondly. In the sense that the immediate state of recovery can move towards pathogenic processes that may result in death, or it can move continuously with a supportive approach to the salutogenic approach far from the diseased state, which certainly leads to recovery and well-being [10] (Figure 1).



Figure 1. Recovery continuity model [10]

The World Health Organization (WHO) refers to defining health as a state where people maintain their health and live within the realities of their daily life situations, where they learn, work, play, and love [11]. As understood from this definition, the built environments have a significant impact on human health and its improvement, so it is important to understand the relationship between health and the built environment to achieve this understanding in a holistic view of potential environmental design. The salutogenic model is a research model and theory developed in the late 1970s by the sociologist Aron Antonovsky presented as a paradigm of health research that focuses on health promotion, recovery, and well-being rather than a medical approach that deals only with disease and resulting injury [12]. In the 1990s, the architect Alan Diani suggested using Antonovsky's theory Antonovsky to create "Psychosocial Supportive Design", a theory and framework that promotes health through the design of the physical environment [13]. Where stimuli a person is exposed to from the internal and external environments are viewed as information that affects our behaviors and feelings, which form a sense of self-coherence [11]. It is clear from above that the salutogenic approach is based on the concept of self-sustaining physical or psychological health by enhancing health support factors provided by life practice, of which design is the main factor.

3. THE CONCEPT OF SENSE OF COHERENCE

Antonovsky defined the individual's Sense of Coherence (SOC) and self-balance as the ability to understand the situation in which he or she is and then use all available internal and external resources to deal with this situation within his capabilities in controlling those resources, and the sense of coherence is defined as the ability to comprehend and understand the surroundings and see life as organized, predictable and interpretable within the resources available to reach demands imposed by the environment surrounding these demands are challenges that deserve to employ the mechanism of individual collective participation to reach dividual coherence [6]. Sense of consistency and coherence of the individuals occupying the built environment is formed through three main factors as follow:

- **Comprehensibility:** The comprehension mechanism or the cognitive dimension of the concept refers to the extent to which one perceives internal and external stimuli as rationally comprehensible, as well as structured, coherent, clear, and orderly information rather than irregular (chaotic, disorganized, random, unexpected, and ambiguous) [14]. Comprehensibility is based on the belief that the challenge posed by the environment is comprehensible and that it is possible to understand the recurring events in an individual's daily life [15].

- **Manageability:** Portability management and control according to considerations of the performance or behavioral dimension, defined as the degree to which a person feels that there are resources at his disposal that can be used to meet the requirements of the stimuli he is exposed to from the environmental environment [14, 15]. Define manageability as the belief that the resources needed to operate are available and that things are Any behavioral trait can be managed and within the scope of the individual's self-control.

- **Significance or Meaningfulness:** Significance, in

terms of the motivational dimension of the environment, refers to the extent to which one feels that life has an emotional meaning and that at least some of the problems that the individual faces face to face are worth commitment and perseverance and are viewed as vital life challenges rather than mere burdens [15].

Design parameters that support psychological and social recovery indicate enhancing the sense of coherence and consistency and stimulate individuals positively mentally and socially. Also, the strength of each individual's sense of coherence is an important factor in facilitating the identification of mechanisms for promoting mental and behavioral health against pressures and tension resulting from the environment, as individuals who believe that they have a strong sense of coherence that results from the concept of challenge (understanding), believe that the resources required to deal with the environment are possible (controllability) and finally to have an actual motive for affective conditioning (meaningfulness) [11]. It is clear from above that the triple Antonovsky theory is achieved as a whole by conditions that enhance the available resources that enable the individual to deal positively with the challenges of tension resulting from the surrounding environment, in the sense of finding an equation for balance that governs the spatial practice of the individual.

4. ANTONOVSKY'S THEORY TO SENSE OF COHERENCE FACTOR

A sense of coherence was defined as Coherence according to Antonovsky's theory. It is the product of the individual's

interaction with the environment through the three characteristics (Comprehensibility, Manageability, and Meaningfulness). According to Antonovsky, one does not have to believe that all of life is profoundly understandable, manageable, and purposeful to have a strong SOC. It is feasible to have a strong SOC and also not see the world as coherent in its entirety. Everyone establishes boundaries, and everything that crosses them—whether it is understandable, reasonable, or important or not—does not concern us. Four spheres—from which Antonovsky claimed it was impossible to nich the boundaries—can be reduced to three: the ego, life, and the world. The basis for this is the belief that "self" relates to "inner feelings," "life" relates to "existential difficulties," and "external world" relates to "main actions." The most important thing is that you recognize the areas of your life that are subjectively important to you and that you believe to be an understandable, manageable, and meaningful scheme (Table1), (individual's subjective feelings, immediate interpersonal relationships, main events, material reality issues). The four domains were included later to be limited to three domains: the self, life, and the external world. Whereas "self" corresponds to inner feelings, "life" corresponds to existential issues, and "external world" corresponds to major activities, and interpersonal relationships are a functional perspective of something that is structurally covered by the other three domains [16].

It is clear from above that the self-coherence of the individual is achieved according to multiple levels that go beyond the inner feelings and the cognitive and behavioral capabilities (at the level of the individual) to the material level in all the existing issues that govern the life practice of spaces.

Table 1. Key questions based of Antonovsky's Theory [16]

	Comprehensibility	Manageability	Meaningfulness
Inner Feeling	How well do you understand your feeling?	How well do you manage your feeling?	How meaningful do you experience your feeling?
Immediate Interpersonal Relations	How well do you understand interpersonal relations?	How well do you manage interpersonal relations?	How meaningful do you experience interpersonal relations?
Major Activities	How well do you understand the external world?	How well do you manage the external world?	How meaningful do you experience the external world?
Existential Issues	How well do you understand your Existence?	How well do you manage to handle your Existence?	How meaningful do you experience your Existence?

5. SUPPORTIVE ENVIRONMENT FOR THE SELF-COHERENCE OF THE OCCUPANT'S WORKPLACE

Social psychology studies of office work environment show that many challenges, fears, and forms of negative behavior may stem from not knowing what others are doing and thus generate a lack of self-coherence, as each office enjoys a space of expression and societal impression, which may be constructive or destructive greatly affected by the physical visual impression provided by the space of the work office. One of the important references for generating the positive expression of the office work environment and the most interactive is the renewed social structure that supports the characteristics of the place. This concept works to develop social relations that build mutual trust between the work team and achieve higher performance, as the whole team becomes a vibrant community of individuals who work with a tangible sense of belonging and active participation [6].

The increasing use of communication and computing

technologies in recent years as an integrated system for managing many of the activities of the administrative buildings, which were considered quick solutions for complex transactions and tasks, led to a reduction or intensification of the workspace required for these tasks, which resulted in changes in the work practices and the organizational structures of the administrative system, which were manifested physically in different places [6]. A routine office workplace reduces human movement and limits personal communication, which has been replaced by electronic communication methods such as email and internal phone calls to replace face-to-face contact between employees. Including merging experiences, increasing communication and personal encounters, and developing social ties compared to non-routine work. Mutual expression or social interaction represents one of the most important pillars of self-cohesion for office occupants, which is an indicator of the level of support provided by the internal environment for their mental health. It is clear from the foregoing that the overall concepts that are related to the

functional requirements (standards) for the office workplace environment may lack a sense of self-cohesion among individuals if they are treated as independent private spaces that are not integrated with a social situation that enhances interaction and social vitality.

6. WORKPLACE THAT SUPPORTS SOCIAL INTERACTION

The characteristics of the spaces vary in the overall mental images and feelings that they reflect among the occupants. Abdul Hameed 2019 indicates in his study that a sense of space may vary according to several factors and variables, as we see most of the senses and perceived characteristics of space vary between the following: sense of friendship and intimacy. Through the characteristics of proportions and scale by covering the entire space or part of the movement paths, sense of sovereignty through the widest visual space it provided or a distinctive panorama, sense of safety or danger through the indicators of space borders, sense of ownership or possession through the feeling of enclosure, the physical boundaries of space, sense of curiosity or curiosity to discover the mystery, sense of expectation, and continuity by signing interconnected successive reference points to track the recipient's eye, a sense of surprise through the signature of an unfamiliar visual scene at the visual sequence of the general movement system. One of the most important interior spaces that reflect the spirit of interaction and vitality by providing places for meeting between the occupants are the spaces of horizontal and vertical movement in the workplace environment, so it is necessary to be effective in its characteristics to support the self-cohesion of individuals.

The characteristics of horizontal and vertical movement axis spaces, that connect corridors and stairs are supporting elements to achieve convergence or encounter which is reflected in the levels of social interaction between employees, as corridors and stairs represent the main horizontal and vertical axis of movement within the building spaces, as circulation intersection points within non-administrative work environments reflect the quality of using certain spaces of the built environment which may give it a special functional and psychological importance to the user, which may cause exaggerate in conceiving its components, either an increase in the positive state as a result of increased occupancy, or an increase in the negative state as a result of a decrease in the rate of space utilization.

The environment supportive of mental health aims to form positive feelings towards the built environment, whereby the occupant feels familiarity, belonging, or containment towards it, which motivates him to explore it and reduces the possibilities of his feelings of anxiety and frustration through the gradual and cumulative acquisition of information for this environment through the senses of the person using it, so he has a reliable mental image during his wandering in it, the mental image has two basic components, one of which is related to the elements of the physical environment such as distances, spaces, spatial relations, and directions, the other component is related to impressions and perceptual sensations associated with that environment [17, 18]. Both components contribute to supporting and enhancing the positive image of these spaces.

Bump theory suggests that the best social interaction mostly happens within the occasional or transitional places

such as corridors and movement areas. The concept is to push or bounce back the perceptual dimension of space happening beyond what is required due to designing shapes of social interaction to reduce partitions and silo spaces between administrative departments to facilitate a meeting or social extension by creating opportunities for distinguished social gatherings [6]. Architectural configurations that promote closeness (like removing interior walls and removing barriers between workstations) tend to facilitate higher levels of work-related and social interactions [11]. Which is what we see open plan offices, on the opposite of the closed plan offices.

As for impact, the elements of stairs and elevators depend on what the work environments achieve in terms of the possibilities of social interaction, as the system of stairs and elevators represents a large part of the daily routine movement of the building's occupants and has an impact directly on physical and mental health. So, it would also be useful to consider strategies to promote physical activity through an environment place the job, physical fitness can serve as a coping mechanism for individuals in a form More effective with stress for individuals [19], as well as it reduces obesity rates for people who usually use the stairs daily [20].

It also affects healthy bone density [21], the positive psychological effect of using the stairs as a journey for individuals between floors. The psychological effect resulting from the structural characteristics of the stairs and movement corridors which affects users through the opportunities it provides to use the stairs and the possibility of making it a point of meeting and social interaction within the stairs and its surroundings is determined by three dominant factors that increase the effective use of the stairs [18]:

- 1) The visual axis of the stairs is relative to the main movement axis of the building as a whole.
- 2) Laying the stairs about the adjacent elevators or collective spaces adjacent to vertical axis movement.
- 3) The optical axis of the elevators relative to the entries system and main movement paths.

Studies also indicate that the aesthetics of the staircase and can give pleasure to use it through the presentation of artistic and decorative works and music, while indication signs or decorative artwork works activate occupancy to slow down, stop when using the stairs relative to the elevators [22]. It is clear from above that the characteristics of the office work environment that support social interaction are based mainly on the patterns of encounter planes between employees within the levels of special office spatial activities, or the general activities of communication with the rest of the office departments.

7. RESEARCH METHODOLOGY

Salutogenic approach as a link and model for the health-promoting design approach provides a basic theoretical framework for psychosocially supportive design. This approach also provides a model and theory for health-promoting design. There is a need for scientific and systematic research and more experimental studies that test this model. Dilani [11] in his study notes that this model posits that health outcomes are not only associated with stress-reducing factors but are associated with environmental traits that can measure the positive effects of health

outcomes. This effort also requires enlightened leadership to guide the system as a whole through a scientifically systematic process. Psychologically supportive design is not only the task of designers, but the entire administrative system must understand the meaning of a psychologically supportive environment, and designers can support the efforts made by working on this approach.

The administrative system must adopt mechanisms to measure the sense of cohesion of the individuals working for it, by achieving data that enables employees (comprehensibility) and realizing the size of the administrative system of the building and acting accordingly, as well as the availability of staff capabilities for adaptation (manageability), and thus to be positively motivated (Meaningfulness). Design's parameters that can be included as healthy factors must be identified as follows: connection with nature, use of art and colors, the sound of music and elements of nature, daylight, use of heritage elements, placement of landmarks and references, harmonious and cheerful color, social interaction and proximity, spatial composition, and its expression, provision of spaces attractive to social support, all of these characteristics seek to combine mentality with positive stimulation that can enhance people's sense of cohesion [11].

Evanse's study also indicates that the process of designing buildings has the potential to create stress and ultimately affect human health factors. At present, we know very little about the potential role of interior design elements in this. The stress and stress that occurs when the requirements of the internal environment exceed the amount of available resources. It may be necessary to conceptualize the design elements that have the potential to have an important impact on human health simulation, coherence, perceptual affordance, control, restoration, and renewal are an initial set of environmental dimensions related to the generation of tension and stress. Creates healthy environments with greater awareness [23] (Table 2).

The practical study was conducted for testing the study hypothesis: There is a relationship between the promotion of social communication for administrative systems. At the interface points of the horizontal and vertical axis of movement and mental health for occupants of the internal environment of workplace offices in terms of activating the role of social interaction as a tool to support self-cohesion.

Levels of design procedures that will be studied within the internal spaces, which are formed from the impact of the design characteristics of the interface points and social interaction on the state of mental health within three layers linked to the concepts of self-cohesion, namely:

- **Properties of space:** which is associated on his own (Comprehensibility): The designer's approach to represent the space and enable users to understand it, and the symbolism that the designer's intentions carry, as well as a holistic understanding of the spatial synthesize a whole [24].
- **Physical and perceptual affordance:** associated with the term (Control or Manageability): portability Management and control according to performance or behavioral considerations on the totality of the affordance resources provided by the internal environment [24].
- **Social interaction:** is associated with the term (Meaningfulness): where Space is a human project realized in the physical world, social process is one of its aspects by which material means and tools make space meaningful [25]. Where the spatial practice is concerned with the social mechanisms used, Table 3 explains the theoretical Framework of Self-coherence SOC.

Table 2. Vocabulary of self-cohesion according to the literature review [researcher]

Items of Self-Coherence	Basic Terms of Antonovsky's Theory	Meaning	Administration	Comprehension
	Krishna Parikh, 2017	Social Process	Affordance	Space
	Evans. W. 2003	Restoration Stimulation	Control	Coherence
	Design Attributes (Alan Delani Translation, 2008)	Social Supportive Music Art Culture Views Comfort Vitality Nature	Aesthetic Natural lighting Green Environments Simulation Restoration Ergonomics Design	Way-finding Colors Nature Perception Landmark Variety

Table 3. Theoretical framework of self-coherence SOC

Antonov Sky's Theory	Krishna Parikh	Alan Delani	Measured Variables
Holistic Comprehensibility	Outer space	Find the way	Clarity of movement paths inside the building. The existence of signs helps to infer within the spaces of movement. The possibility of inferring the position of the stairs. To understand the relationship between the parts of the building and the stairs.
		Use of colors Nature use Indication and signals system The level of complexity of the system Connection with the outside System structure Positive stimuli	The colors used in the interior finishes express the building. Existence of natural elements within the space. Visual elements are distinguishing the space. The clarity in comprehension building plan. Clarity of jobs distributed in the building. Existence of motion and visual communication within outdoor spaces. Existence contrast between office spaces and traffic corridors (discrimination in colors and finishing materials).
Manageable	Data (It relates	Aesthetic elements	The use of furnishing elements as aesthetic elements within the

&Control	to the level of effectiveness)	Control environmental elements	space. The amount of ventilation and appropriate lighting in the space can be controlled through openings and windows.
		Green environments	There are indoor green spaces suitable for sitting and relaxing.
		Interior design	Floor tiling in a way that gives attractive designs. Interior colors and finishes generate a state of intimacy.
		Ergonomic design	Use of materials to reduce noise within the space. Feast design dimensions to stairs for daily use.
		The distances between spaces	The distance between the functional parts of the building and the stairs is appropriate. Relevance the length of movement corridors in the building.
		Contact points	Using movement spaces as a point of communication between office employees.
		Furniture arrangement	The availability of appropriate furniture to use the corridors as a resting space. Electrical and electronic equipment can be used easily.
		Privacy	There is adequate isolation between the different functions and events.
		Gathering support space	There are suitable spaces for social interaction in the corridors and gathering places.
		Meaningfulness	Social interaction
Heritage items	Existence artistic elements catch your eye in the hallways.		
Space separation	The presence of elements bearing heritage and societal aspects. Discrimination interior spaces of external.		
Space interference (views)	The presence of a natural view encourages you to be present in corridors and gathering spaces. There is a view in the staircase space that makes it enjoyable to use.		
Resting places	The aisles are crammed in building. There are adequate areas for sitting and resting.		
		Distractions (pauses)	Use of hallways spaces and places for mental meditation.

8. PRACTICAL STUDY

The practical study was conducted based on the procedural definition of the sense of coherence: the characteristics of spaces that enhance the ability of the individual to deal effectively with the available resources of the administrative and spatial system according to what it achieves from planes of public and private social interaction. The procedure is to measure the effect of the characteristics of spaces that enhance social support in the office workplace environment as one of the factors of self-cohesion. SOC through quantitative and qualitative approaches according to the following:

- Election of the field of study consisting of (5) buildings of the campus faculties of the University of Mosul, Figure 2, as typical educational buildings that serve the segment of administrative staff within the university campus.

- Quantitative research methodology in measuring the design characteristics of the structural and visual structure of the movement spaces that generate the surfaces of encounter and convergence between employees through the Depth Map software. The software provides a way to measure the independent variables represented by the visual characteristics and their relationship to the movement system of the building.
- The qualitative research methodology is represented by a questionnaire for the opinions of the categories of employees occupying the administrative buildings of the elected buildings to measure the approved variables represented by the factors supporting social interaction between them, and achieved as a result of the characteristics of the visual and spatial system, according to the five-point Likert scale of the Convention (1-5) Appendix (1).

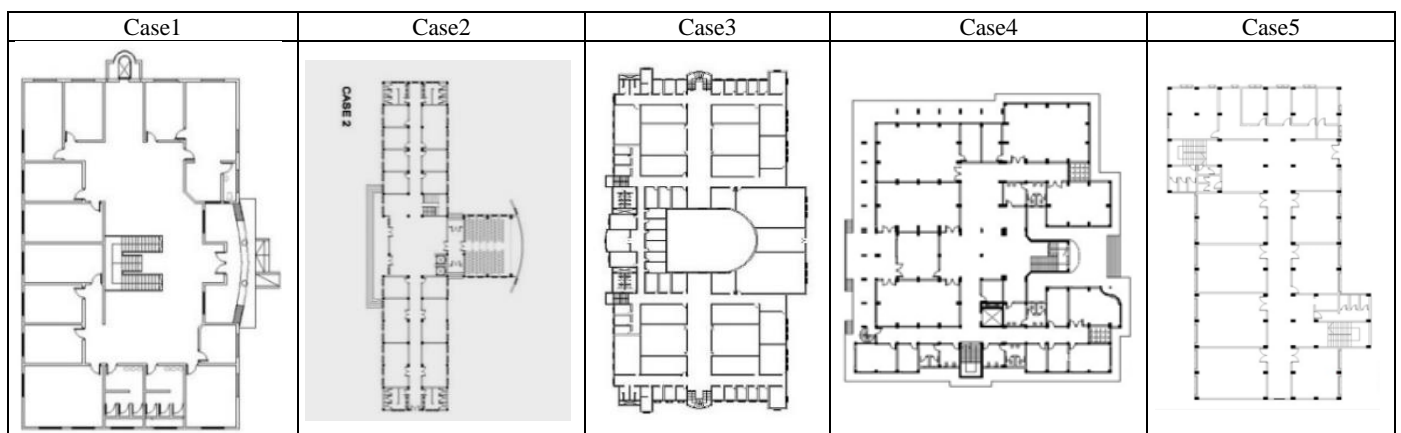


Figure 2. Selected cases study for the buildings of the colleges - University of Mosul

To evaluate the impact of internal spaces on the buildings of the University of Mosul, a questionnaire was conducted that included information on the respondents for the employees of the University of Mosul working in closed offices, whose number is estimated at (30) for each sample. through three axes of questions related to the study for assessing the levels of self-coherence and linking them to the architectural determinants, where the first group of questions is linked to the first item (comprehensibility) and is related to the characteristics of space, the second group is linked to the second item (management and control) which is related to physical affordance resources available to perform effectiveness. The third group is associated with the term (meaningfulness) and relates to the level of interaction between individuals provided by the meeting and encounter places.

To perform the visual analysis Depth Map software was used to analyze the Isovist graph of the building's plan for each case study to link the results related to the quantitative measurement of measuring visual communication within spaces with the results of the qualitative measurement of the questionnaire and to find statistical relationships according to the SPSS software.

8.1 Discuss the results

The results of the questionnaire of the selected sample of the study cases (5) indicated that there is a significant discrepancy in the responses to the study cases, according to Table 4 by adopting the five-point Likert scale as follows:

First: the characteristics of building spaces that enhance individuals' Comprehensibility according to the five-point Likert scale:

The results of the first axis indicated the effect of the characteristics of the movement spaces in supporting the holistic comprehensibility of its structure by its users, that the values of the highest agreement on the clarity of movement paths inside the building (V1) about the novice users of the building is for building (1) with a value of (4.33), while the least consensus for the users of the building (3) with a value of (3.03). Accord values of agreement on paying attention to the presence of signs that help to infer within the spaces of movement (V2) were neutral for all buildings between (2.88-3.40), which indicates a lack of effectiveness of the indicative systems.

The highest agreement for possibility in inferring the position of the stairs (V3) is for building (1) with a value of (4.20), and the lowest value is for building (3) with a value of (2.88). Higher values agree that the location of the stairs is suitable for connecting the parts of the building well (V4) It is for buildings (1 and 5) with a value of (4.18), while the lowest value for the agreement is for building (3) with a value of (3.09). Higher values agree that the relationship between the parts of the building and the stairs is understood (V5) Almost all buildings had (1,2,4,5) with a value of (3.88), except for Building (3) with a value of (2.88).

Agree values that the colors used in the interior finishes express the function of the building (V6) was neutral for most buildings with a value of (3.40-3.80), except for building (3) with a value of (2.30). Accord values to pay attention to the presence of natural elements within the space(V7) was very neutral for all buildings with a value ranging between (2.10 - 2.88), which indicates that these elements are not activated in the movement system. Rate the highest agreement on the ability to understand the building plan, buildings had (2,4,5)

with a value of (3.88), while the lowest value was for building (3) with a value of (2.40).

Rate the highest agreement on clear functions distribution in the building (V9) is for building (5) with a value of (3.77), while the lowest value is for building (3) with a value of (2.55). Values higher agreement on the presence of attention to communication between the internal corridors and the external spaces(V10) is for building (4) with a value of (3.73), while the lowest value is for building (3) with a value of (2.50). The overall results of the first axis showed a clear difference in the levels of understanding and awareness of the characteristics of the visual and kinetic system, and this is a reflection of the impact of these characteristics in shaping the surfaces of encounter and social interaction.

Table 4. Average values of responses to a questionnaire for the five case studies

Mean of Questionnaire						
Case-5	Case-4	Case-3	Case-2	Case-1		
4.0333	4.0667	3.0333	4.2333	4.3333	V1	The results of the first axis
3.0667	3.4000	2.8000	3.2667	2.9000	V2	
3.8667	3.9333	2.8333	3.3667	4.2000	V3	
4.1000	3.9333	3.0667	4.0667	4.1786	V4	
3.8667	3.8667	2.8333	3.8667	3.7333	V5	
3.4667	3.6000	2.3667	3.3000	3.7667	V6	
2.3333	2.8000	2.1333	2.7000	2.6333	V7	
3.8333	3.8276	2.4333	3.8667	3.7000	V8	
3.7333	3.4000	2.5667	3.4667	3.6667	V9	The results of the second axis
3.2333	3.7333	2.5000	3.4667	2.9333	V10	
2.9667	3.0667	2.2333	3.9000	3.0000	V11	
3.0000	3.8667	2.1000	4.1667	3.6667	V12	
2.6333	2.5333	2.1000	3.4000	2.2000	V13	
3.1667	3.6000	2.2667	3.5517	3.0667	V14	
3.3667	3.5333	2.6000	3.7000	3.3667	V15	
3.3667	3.4667	2.5333	3.4667	3.0000	V16	
3.6000	3.6667	2.6000	3.9000	3.4000	V17	
3.5667	3.8667	2.5000	3.9333	3.7667	V18	
3.4000	3.7333	2.2000	3.3000	3.3000	V19	
3.0333	5.0000	2.2667	3.2333	2.8214	V20	
3.1000	3.5333	2.7667	3.4333	3.1667	V21	
3.0333	3.1333	2.5000	3.4000	3.1333	V22	
3.1333	3.8667	2.1333	3.4333	3.0000	V23	
2.7667	3.2667	1.9333	4.0000	1.8333	V24	
2.6000	2.9333	1.8667	2.4000	1.9000	V25	
2.1667	2.4667	1.7667	2.1000	1.8571	V26	
2.7000	2.8667	1.7667	2.7667	2.3667	V27	
2.4333	3.1333	2.0000	2.7333	2.0667	V28	
3.2333	3.1333	2.6333	2.7333	2.2667	V29	
3.1667	2.8000	2.2000	3.4667	2.9667	V30	

Second: the characteristics of gathering spaces and movement that enhance the possibility of control by its users:

The results of the second axis to measure the impact of the available resources for movement spaces in supporting the possibility of control by individuals in the performance of functional activities in a way that supports their self-coherence indicated that the values of the highest agreement for using furnishing elements as aesthetic elements within the space(v11) is for building (2) with a value of (3.90), the lowest agreement is for building (3) with a value of (2.25).

The values with the highest agreement about the amount of ventilation and appropriate lighting in the space that can be controlled through openings and windows (V12) is for building (2) with a value of (4.16), and the lowest agreement is for building (3) with a value of (2.10). Accord values of

indoor green spaces that are suitable for sitting and relaxing (V13) were neutral for all buildings except building (2) with a value of (3.40).

Accord values to pay attention to Floor tiling in a way that gives attractive designs (V14) were also neutral, except for (3) with a value of (2.60). Agree values that Interior colors and finishes generate a state of intimacy (V15) for most buildings between (3.36-3.70), except for building (3) with a value of (2.60).

Agree values that dimensions of the stairs are suitable for daily use(V16) for most buildings with a value of (3.00–3.46) except for building (3) with a value of (2.56). Agree on values that the distance between the functional parts of the building and the stairs is appropriate (V17) For most buildings, with a value of (3.00 -3.90), except for Building (3), with a value of (2.60).

Higher values agreement on that length of the traffic corridors in the building is adequate H (V18) for building (2) with a value of (3.9) and the lowest value for building (3) with a value of (2.5). The highest values agree on its Movement spaces can be used as meeting points for office staff and business offices (V19) for building (4) with a value of (3.70) and the lowest value for building (3) with a value of (2.26).

Rate the highest agreement on the availability of appropriate furniture to use the corridors as a resting space(V20) for building (4) with a value of (5.00) and the lowest value for building (3) with a value of (2.20). The agreement values of the variables (V21-V22) which indicate the possibility easily use of electrical and electronic equipment and that there is proper isolation between different functions and activities, were neutral and non-expressive for all study cases.

The overall results of the second axis showed a clear discrepancy in the levels of control and control over the details and capabilities of the internal environment, and this is a reflection of the impact of the levels of clarity or complexity of those details and their acceptance by individuals.

Third: the characteristics of meeting spaces that enhance social interaction:

The results of third axis indicated that the spaces of movement and vertical movement provide the possibilities of meeting and social interaction between individuals, that the values of the highest agreement to find spaces for social interaction in hallways and gathering places (v23) is for building (4) with a value of (3.88), while the lowest value is for building (3) with a value of (2.13).

The highest agreement to find a suitable space in the staircase plate for a quick chat (v14) for building (2) with a value of (4.00), while the lowest value for building (1) with a value of (1.88). Agreement values (V25) for artistic elements that catch your eye in the hallways was neutral for buildings (2,4,5), while the lowest value was for buildings (1,3), with a value of (1.86).

Agreement (V26) with finding elements containing heritage and societal aspects, was neutral for buildings (2,4,5), while lowest value was for buildings (1,3) with a value of (1.76). The highest agreement values of (V28) on the presence of a view in the staircase space makes the use of the stairs more enjoyable, in building (4) had a value of (3.13), while the rest of the buildings are mostly neutral.

Agreement values for the variable (V29) on that hallways are overcrowded significantly; it was neutral for most of the

buildings between the values (2.26-3.13). Highest agreement value (V30) for finding adequate spaces to sit and rest within the spaces of hallways and corridors in the building, was for building (2) with a value of (3.46) and lowest value for building (3) with a value of (2.20).

The overall results of the third axis showed a clear variation in the levels of satisfaction with the features and elements of the surfaces of social encounters, and this is a reflection of the impact of those features in supporting and encouraging the social structure (Table 5).

Table 5. Average values of the optical properties of the horizontal and vertical transitional spaces for the study cases

Cases	Connectivity	Isovist Area	Visual Integration	Isovist Max Radial	Visual Entropy
1	614,406	97,784	16,323	15,350	1,137
2	578,953	152.26	29,291	37,195	0.895
3	388,281	65,612	3,995	19,136	2,423
4	292,181	107,025	9,824	18,627	1,345
5	747,521	115,179	13,550	21,231	1,226

When the results of the designing characteristics of the study cases (5) according to Depth Map software for optical properties Isovist graph is as follows:

The measurement results for the visual characteristic's average values of the buildings indicated that there is an important discrepancy between the five study cases, due to the clear variation in their structural compositional relationship and the relationships of transitional spaces with points of stairs and elevators. The results also indicated that there are statistical correlations between those values as independent variables with the results of the qualitative measurement of the resolution (agreement level) as dependent variables, as follows:

- A strong direct correlation with a value of (+0.712) at a significant level (0.1) between the rates of agreement of individuals on the holistic comprehensibility of the building with the visual space factor.
- A strong direct correlation with a value of (+0.580) at a significant level (0.3) between the rates of agreement on the holistic comprehensibility of the building with the variable of visual integration of spaces.
- A strong inverse correlation with a value of (-0.938) and a significant level of (0.01) between the rates of comprehensive comprehensibility of the building with the variable of the interior view of the spaces with the movement system and circulation, which indicates the difficulty of accommodating the building from the deep interior visual points.
- A strong direct correlation with a value of (+0.857) at a significant level (0.06) between the resources available for management and control by individuals, and between the visual space factor.
- A strong direct correlation with a value of (+0.687) and a significant level of (0.2) between the resources available to control the performance of activities, and the visual integration of the building.
- A strong direct relationship with a value of (+0.789) at a significant level (0.4) between the resources that support

social interaction between individuals and visual space.

- A strong direct relationship with a value of (+0.451) at a significant level (0.4) between the resources that support social interaction between individuals and the maximum visual extension.

The results of the relationship of factors that enhance the sense of cohesion with the visual characteristics of the movement system of the elected buildings through their support for social interaction indicated the importance of both visual space and visual integration in enhancing both the holistic understanding of the space system as well as the possibility of controlling and controlling the surfaces of the movement spaces, which enhances social interaction.

9. CONCLUSIONS

The following are the most important conclusions of the study:

- The study concluded the importance of the characteristics of the built environment in the workplace, forming meeting places that enhance social interaction between categories of employees, within the system of horizontal and vertical movement, for achieving a sense of self-coherence for its users.
- The practical study concluded that the structural compositional relationship of the building spaces and the movement system plays a greater role in communicating a holistic comprehensibility of the organizing system as a whole among its users, while the characteristics of the elements of the building movement system spaces play a less role in achieving the indicator of the performance for administrative activities, and finally, the characteristics of the elements of the meeting and gathering places of the movement system of the building play Unclear role in enhancing social interaction between individuals, which calls for greater attention.
- Movement systems combined with an important main axis have better visual characteristics (communication, visual space, and Isovist Max Radial) than widespread and grid movement systems, due to the dispersion of gathering places at vertical movement points and their lack of clarity, thus discouraging encounters and gathering between users.
- Visual analysis software can be adopted for the system of movement spaces for administrative buildings depth map in the initial measurement of the nature of structural compositional that enhance social interaction and presented as a tool in feasibility studies of projects related to the health-promoting approach.

10. RECOMMENDATIONS

The study presents a practical approach to measuring perceptual phenomena (such as the sense of coherence) by examining the relationship of physical properties to the optical properties of space systems.

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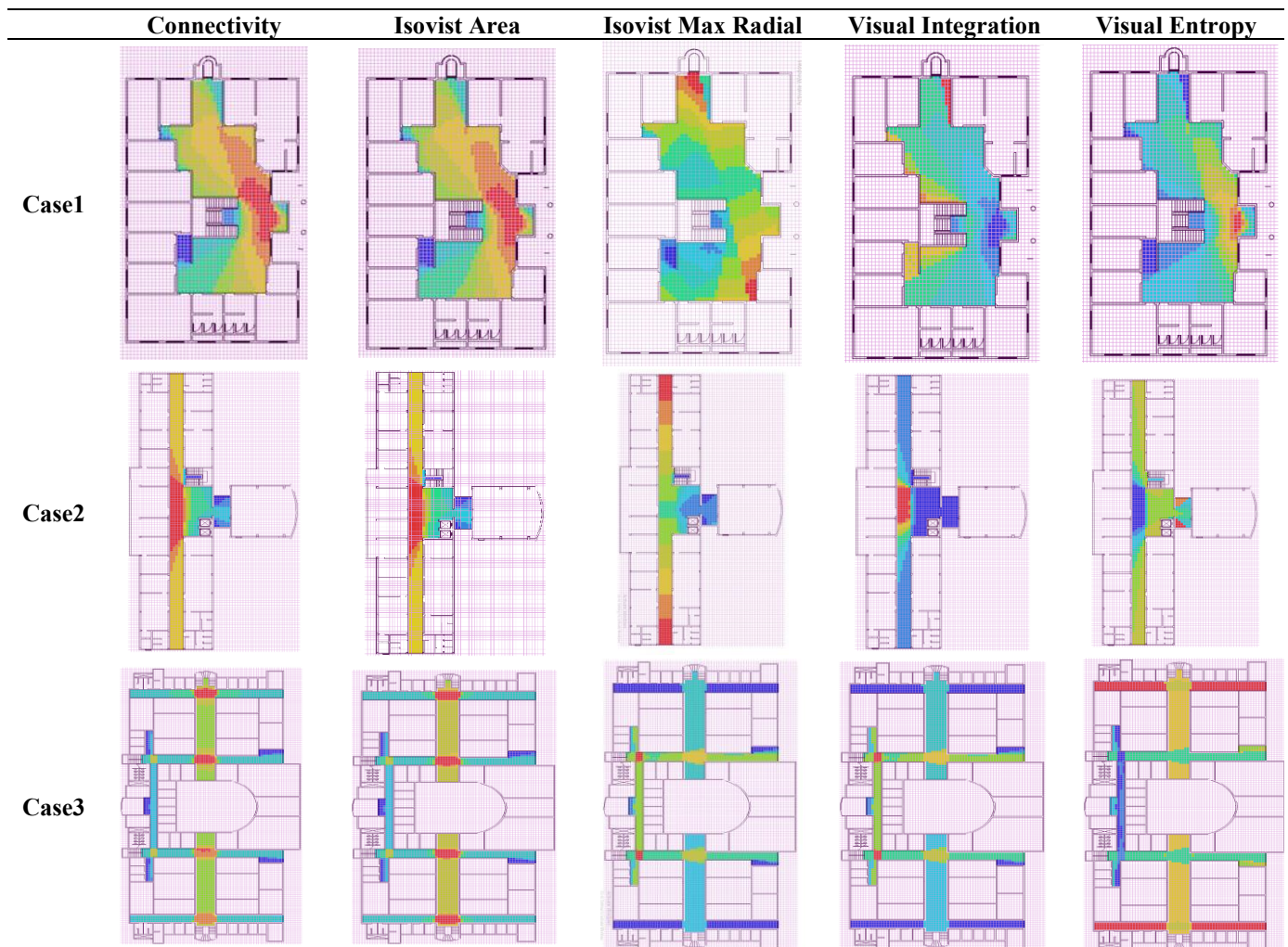
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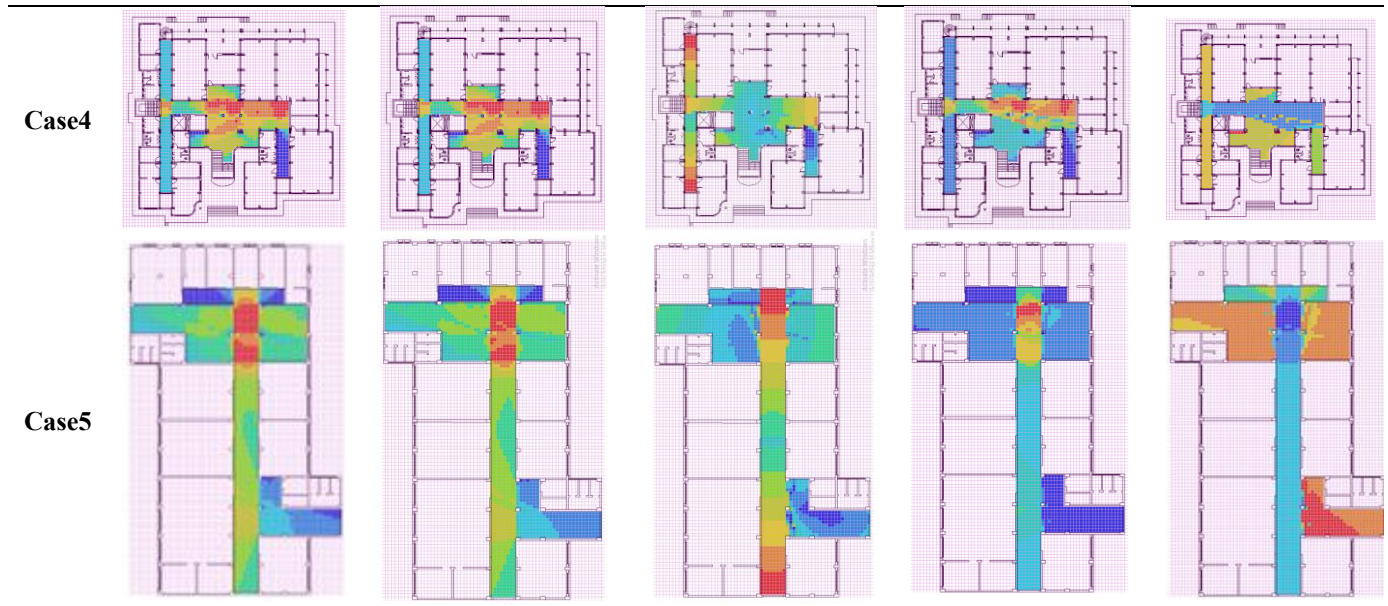
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APPENDIX

Appendix 1. Visual analysis results for Isovist graph for selected study cases





Appendix 2
University of Mosul/College of Engineering / Department of Architecture

Questioner for evaluating internal spaces movement in the University of Mosul buildings

Honorable Mr. / Mrs. would you please express your opinions regarding the use of the internal movement in the University of Mosul buildings, in terms of the use of daily and social activities, and the level of satisfaction with the climate factors available in the internal space, the daily activities, to help evaluate the reality of the state of those spaces according to a scientific approach that promotes

mechanisms for the development and optimal use of internal movement spaces. with many thanks and appreciation.

number the form:

Firstly General questions

1. Date:
2. Age:
3. Gender:
4. The building's name

Second: Research Questions:

The first axis: the characteristics of the building spaces that enhance individuals' understanding of its structure and elements.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
V1	Movement paths within the building are clear					
V2	Some signs help to infer within the spaces of movement					
V3	The possibility of inferring the position of the stairs					
V4	The location of the stairs is suitable for connecting the parts of the building appropriately					
V5	The relationship between the parts of the building and the stairs is understood					
V6	The colors used in the interior finishes express the function of the building					
V7	The presence of natural elements within the space					
V8	The ability to understand the building plan					
V9	Clear job distribution in the building					
V10	Is there kinetic communication between the inner times and the outer spaces?					

The second axis: the characteristics of gathering spaces and movement that enhance the possibility of control and control by its users

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
V11	Using furnishings as aesthetic elements within the space					
V12	The amount of ventilation and appropriate lighting in the space can be controlled through openings and windows					
V13	There are indoor green spaces suitable for sitting and relaxing					
V14	Floor tiling in a way that gives attractive designs					
V15	Interior colors and finishes generate a state of intimacy					

V16	The dimensions of the drawer design are suitable for daily use
V17	The distance between the functional parts of the building and the stairs is appropriate
V18	The length of the traffic corridors in the building is adequate
V19	Movement spaces can be used as meeting points for office staff and business offices
V20	The availability of appropriate furniture to use the corridors as a resting space
V21	Electrical and electronic equipment can be used easily
V22	There is adequate isolation between the different functions and events

The third axis: Characteristics of meeting spaces that enhance social interaction:

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
V23	There are Adequate spaces for social interaction in corridors and gathering places					
V24	There is adequate space in the tray for a quick chat					
V25	There are artistic elements that catch your eye in the hallways					
V26	Are there elements that carry cultural and societal aspects?					
V27	The presence of a natural view encourages you to be present in the corridors and gathering spaces					
V28	The presence of a view in the staircase space makes the use of the stairs more enjoyable					
V29	Corridors crammed into space?					
V30	There are adequate areas for sitting and resting in hallways and corridors					