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OCCUPATIONAL ISO STANDARD OF TEXTILES WORKPLACE FOR HEALTH & SAFETY CONDITIONS

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Abstract:

the characteristics of ISO standard of textile workplace for occupational health & safety & environmental conditions by ISO 14001 & 45001 spatial settings that are examined include five workstation spatial parameters of textiles workplace of accordance with ISO 14001 &45001 variables that are derived from layout variables of the floor plan that we propose based on our experience with textile workplace of accordance with ISO 14001 & 45001 design and evaluation.

The parameters encompassing these are-spatial parameters of textiles textile workplace of accordance with ISO 14001 & 45001arrangement, furniture and ergonomics, air and thermal, lighting and acoustics. It implies that the employees need environmental support for performing the activities leading to positive physiological and psychological impact and improved performances.

the aims at investigating a correlation if any of workspace designs and its impact on the users, of spatial parameters of textile workplace of accordance with ISO 14001&45001 for occupational health, safety & environmental conditions through a quantitative and qualitative analysis of various parameters, occupants in terms of parameters to achieve satisfaction, comfort and efficiency of the selected workspaces. Contexts and parameters and the methodologies adopted are based either on quantitative, qualitative and experimental research strategies.

Results perception about several of environment shall give better justification if correlated with physical measurements. Functional comfort and related behavioral responses if assessed quantitatively and qualitatively in better environmental conditions and work output. this study is done for employees in a Giza Spinning & Weaving Co. is a leading Egyptian ready-made garments exporter boasting fully integrated operations and a well-diversified portfolio of renowned international brands. The Company is one of the biggest manufacturers and trusted names in the in Egyptian textiles sector. Wherein the workspace design, layout, furniture, noise, air quality are given equal importance to examine the relationship between workspace physical conditions and employee's productivity.

Keywords: spatial parameters, textile workplace, ISO 14001 & 45001, occupational.

1. Introduction

The Occupational Health and Safety (OHS) standards for the textile industry are important for ensuring that workers are protected from potential hazards that may arise in the workplace. These standards are guided by various organizations and regulatory frameworks, including the International Organization for Standardization (ISO). The ISO standards that may be relevant to textiles workplaces primarily focus on the general health and safety of workers, as well as the prevention of risks arising from exposure to physical, chemical, and ergonomic hazards in the textile industry [1,3].

Comfort and performance standards in the workspaces have become a primary concern in Egypt recently and hence there is a remarkable change in designing strategies adopted for the same. The end users of such spaces are the occupants who are spending major time in these spaces and therefore the indoor environmental factors in workplaces should follow functional as well as behavioral requirements. Presently

there is no clear-cut demarcation as working or non-working hours, the concept of working environment is progressively shifting towards better comfortable situations and increased performance is assumed to be the result of good textile workplace of accordance with ISO 14001 & 45001 environment. The environmental aspects include physiological [7], sociological and psychological comfort. Another study is done in Asia countries, building as Post-Occupancy Evaluation based on qualitative survey related to thermal comfort, air movement noise and cleanliness. The outcome of the survey is visual comfort; Indoor air movement and ventilation constitute the highest factor in terms of occupant's comfort ability.

- Textile workplace of accordance with ISO 14001 & 45001spatial parameters [14]:
- Outcomes Reactions
- Job characteristics
- Personality
- Individual environmental experience

Interpersonal experience

1.1.Key ISO Standards Relevant to Textile Industry Health and Safety:

1. **ISO 45001:2018 - Occupational Health and Safety Management Systems**

❖ **Purpose:** ISO 45001 outlines the requirements for establishing, implementing, and maintaining an Occupational Health and Safety Management System (OHSMS). It is applicable to any organization that aims to improve safety at the workplace, including textile manufacturing settings.

❖ **Highlights:**

- Risk management and hazard assessment in the workplace.
- Worker participation and consultation.
- Developing procedures for handling incidents and emergencies.
- Regular monitoring and evaluation of workplace safety measures.

2. **ISO 9001:2015 - Quality Management Systems**

❖ **Purpose:** Though ISO 9001 is focused on quality management, its principles often overlap with health and safety practices. Implementing a quality management system can lead to more consistent and safer production practices in textile workplaces.

❖ **Highlights:**

- Risk-based thinking.
- Continuous improvement.
- Managing resources effectively to maintain safe working conditions.

3. **ISO 14001:2015 - Environmental Management Systems**

❖ **Purpose:** This standard focuses on managing the environmental impacts of an organization's activities. It has health and safety relevance, especially when considering the chemical and waste management processes in textile production.

❖ **Highlights:**

- Identifying environmental risks (such as chemical exposure from dyes or treatments).
- Waste disposal and contamination control, which can directly affect worker health.
- Regular environmental audits.

4. **ISO 13485:2016 - Quality Management Systems for Medical Devices**

- While not directly related to textiles, some textile products, like medical textiles, may fall under ISO 13485, which includes health and safety provisions for manufacturing medical-grade textiles [3,5].

5. **ISO 50001:2018 - Energy Management Systems**

- This standard deals with energy use, which is important in textile production where energy consumption is often high. Ensuring safe energy management practices is essential for the safety of employees working in textile mills and factories.

6. **ISO 18601:2013 - Textiles - Care Labelling Code of Practice**

- This addresses the labeling of textiles, ensuring workers are aware of product care instructions that may impact the safety of handling materials [10], particularly in cases involving chemicals used for dyeing and finishing textiles.

1.2.**Textiles workplace of accordance with ISO 14001 & 45001.**

Spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 for occupational health & safety & environmental conditions comfort is another key factor that determines to which extent workers are satisfied and motivated in their workplace typology. Spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 for comfort here define that employees feel at home at their textile workplace of accordance with ISO 14001 & 45001. For example, they can ensure their privacy, or they can

have a sense of belonging in their working group through the spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 design of the office. Although this is a quite subjective factor, it is worthwhile to mention for office design.

1.2.1. **Spatial Parameters of Textiles Workplace Configuration [4]**

- For measuring spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 configuration. in their overwhelming majority researchers employed at least two metrics, typically capturing different aspects of configuration such as the local properties of space column 'local',
- The effects of the configuration of the whole building or site global, the placement of attractors Attractor and in some case the placement of people Network.
- Examined the metrics in a model that contained more than one variable, relied on bivariate statistical analysis.
- The activities became generally more predictable with more variables. Taking the analysis one step further even carried out cross-correlation analysis between the variables to reduce duplicate information.
- The analysis specifically that the various properties related between them and with mean depth, and thus eventually only used one connectivity for further analysis. More recent cases have applied advanced techniques such as Principal Component Analysis (PCA) to separate the information contained in those metrics into useful measurements. [13,14.15]

1.3.**Problem Statement**: Textile workplaces often face challenges in balancing production efficiency with worker well-being and environmental impact. While proper layout and spatial design can significantly improve these aspects, a lack of clear guidelines on optimal spatial parameters for textile workplaces exists [3].

- **Research Objectives**: This paper presents an empirical study and quantitative and qualitative analysis of spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 as functional and related behavioral parameters of selected office spaces with three different densities of working population [3,6].
- Identify occupational health and safety (OH&S) hazards specific to the textile industry and how spatial design can mitigate them (e.g., ergonomic risks, noise exposure, and dust inhalation).
- Analyze environmental concerns in textile production (e.g., air and water pollution, waste generation) and how spatial configurations can minimize them [4][14].
- Investigate the impact of spatial parameters on worker productivity and well-being in textile workplaces (e.g., lighting, ventilation, noise levels, and personal space.
- Develop recommendations for optimal spatial layouts in textile workplaces that comply with ISO 14001 and ISO 45001 standards.
- This research investigates the optimal spatial parameters for textile workplaces to ensure compliance with ISO 14001 environmental management and ISO 45001 occupational health and safety [1,2,12].
- To determine occupant's comfort, performance, satisfaction and perception levels by investigating and establishing association if any (positive/negative) between subjective and objective variables.
    1) For lighting as a parameter
    2) For air and thermal parameter
- To evaluate the users' subjective opinion related to the parameters leading to efficiency and comfort and aspects that lead to their enhancement.
- To determine the preferences for the physical and psychological parameters based on the subjective opinions given by the occupants for achieving comfort and efficiency with: –
    1) Group wise (sample size) comparison within the selected fifteen offices.
    2) Type wise comparison within the selected fifteen offices.
- To suggest preferential parameters as per users' choice to be considered while planning workspaces in similar context.
- Review existing research on the relationship between workplace design and OH&S in the textile industry.
- Explore studies on the impact of spatial configuration on environmental performance in manufacturing facilities.
- Analyze ergonomic principles and their application to textile workplace design.
- Investigate the effect of lighting, ventilation, and noise levels on worker productivity and well-being in industrial settings.

2. **Methodology**: This research may employ a mixed-methods approach:
- Surveys: Conduct surveys among textile workers to understand their experience with OH&S concerns and preferences for workplace layout.
- Case Studies: Analyze successful examples of textile workplaces that have implemented spatial designs for improved OH&S and environmental performance. [7]
- Expert Interviews: Interview occupational health and safety professionals, ergonomists, and environmental engineers to gather insights on best practices for spatial design in textile workplaces.
- Designing a textile workplace for ISO 14001 & 45001 compliance: optimizing occupational health, safety, and Environment
- Building a textile workplace that prioritizes both worker well-being and environmental responsibility is key to achieving success in today's market. Here's a breakdown of key considerations for designing a workplace that meets the requirements of ISO 14001 (environmental management) and ISO 45001 (occupational health and safety).

2.1.Key Health and Safety Issues in Textile Workplaces:

1. **Chemical Exposure:**
- Workers in textile factories may be exposed to harmful chemicals used in dyeing, finishing, and other treatments. ISO standards would require safe handling, storage, and disposal practices to minimize risks.
2. **Ergonomic Hazards:**
- Long shifts, repetitive tasks, and manual labor can result in musculoskeletal disorders. ISO 45001 and related standards focus on ergonomic assessments and improvements to reduce the strain on workers.
3. **Noise Pollution:**
- Textile factories, particularly those involving spinning or weaving, can be noisy, leading to hearing impairment over time. ISO guidelines recommend noise control measures, such as soundproofing or ear protection.
4. **Fire Safety:**
- The presence of flammable materials in the textile industry increases the risk of fires. Workplace safety standards (including ISO 45001) include fire safety protocols and emergency response plans.
5. **Dust and Air Quality:**
- Dust from fibers and other materials in the air can be a significant respiratory hazard. Implementing ISO 45001 includes guidelines for controlling airborne particles and ensuring air quality standards.
6. **Machine Safety:**
- Heavy machinery, such as looms, spinning machines, and cutting tools, pose mechanical hazards. ISO standards call for machine guards, regular maintenance, and operator training to prevent accidents.

2.2.**Occupational Health & Safety (ISO 45001) Considerations:**
- Hazard identification & risk assessment: Identify potential hazards specific to textile production, such as repetitive motions ergonomics, noise exposure (weaving looms), and dust inhalation (cotton processing).
- Spatial design for mitigating risks:
- Ergonomics: Design workstations with adjustable equipment, proper lifting techniques, and adequate breaks to minimize muscular strain and repetitive stress injuries.
- Noise control: Implement noise barriers, use quieter machinery, and provide personal protective equipment (PPE) like earplugs to reduce noise levels.
- Air Quality: Ensure proper ventilation systems to remove dust particles and maintain comfortable temperatures.
- Emergency Preparedness: Develop evacuation plans, designate fire exits, and provide training on emergency procedures.
- Employee Engagement: Train workers on safe work practices, encourage reporting of hazards, and foster a culture of safety awareness.

2.3.Environmental Management (ISO 14001) Considerations [7]:
- Waste Reduction & Recycling: Implement waste segregation strategies for textile scraps, leftover dyes, and packaging materials [10,12]. Explore possibilities for recycling or repurposing waste.

- Energy Efficiency: Utilize energy-efficient lighting systems, optimize heating/cooling systems, and incentivize responsible energy use by employees.
- Water Conservation: Install water-saving fixtures, implement leak detection and repair systems, and consider rainwater harvesting for non-critical uses.
- Pollution Control: Invest in air filtration systems to minimize dust and chemical emissions. Treat wastewater before discharge to comply with environmental regulations.

2.4.**Spatial Design for Optimization:**

- Workstation Layout: Plan workstations with adequate spacing for safe movement, minimizing worker interaction and potential collisions.
- Natural Lighting: Maximize natural light penetration to reduce reliance on artificial lighting and improve worker well-being.
- Segregation of Processes: Separate noisy or dust-generating processes from quieter areas to minimize worker exposure.
- Designated Storage Areas: Implement designated storage areas for materials and chemicals to prevent clutter and potential hazards.
- Green Spaces: Consider incorporating indoor plants or green walls for improved air quality and employee well-being.

2.5.**Benefits of a Compliant Workplace:**

- Reduced workplace accidents and illnesses.
- Improved worker morale and productivity.
- Lower environmental impact and regulatory compliance.
- Enhanced brand reputation and customer trust.

2.6.**Selected Workspaces** :Textile workplace of accordance with ISO 14001&45001selection is made from city as a part of administrative offices dealing with paper, coal, IT services, sale and purchase, food products, chartered accountancy, export- import and news agency, That are again categorized as administrative, IT Companies The study is based on physiological, sociological and psychological comfort criteria; the focus being on the impact of functional and behavioral parameters on the performance of the occupants. The evaluation done is on the basis of quantitative and qualitative data collected related to above mentioned parameters for all the offices. A general description with existing physical conditions is included about the offices. The commonalities in the selected fifteen offices are [8,12,15]:

- All the selected offices are designed for the purpose and have a frame structure construction.
- The spatial parameters of textiles workplace of accordance with ISO 14001 & 45001arrangement comprises of a mixed type- combination of cabins, cubicles and open workstations.

2.7.**Description of the Organization**

Giza Spinning & Weaving Co. is a leading Egyptian ready-made garments exporter boasting fully integrated operations and a well-diversified portfolio of renowned international brands. The company is one of the biggest manufacturers and trusted names in the textile sector in Egypt.

The Company was established as a family business in 1979 by Mr. Mohamed Marzouk and has since grown its operations organically through the addition of many internationally renowned brands, and expanding across several facilities undertaking spinning, dyeing, knitting, printing, cutting, sewing, washing and finishing activities. The Company has also ventured into retailing activities in the local market, selling its products through a growing chain of 18 stores located across the country

Giza co. for Upper Egypt development is subsidiary of the mother company& has 2 factories as below:

Factory#1:
Location: El-Minya, Cairo
Employees: 790
Plant Size: 7,300 m2
Start Operating: June-2018
Garment Capacity /Year: 2.0mn Pcs

Factory#2:
Location: El-Minya, Cairo
Employees: 262
Plant Size: 7,300 m2
Start Operating: October-2018
Garment Capacity /Year: 1.0 mn Pcs

2.8.CONTEXT OF THE ORGANIZATION

2.8.1. Internal and external issues of the Organization

- The Company has defined and documented its entire internal and external context that were relevant to its purpose and its strategic direction and that affected its ability to achieve the intended results of its integrated management system and documented these issues within its QMS.
- Checked external issues register code FP-15-01 it includes political, economic, social, technological, legal, economic >>>> issues are determined such rate of exchange of Foreign currency, logistics problems, high Prices of exported raw material (Cotton)
- Impact of determined issues are determined as well as the actions needed checked internal issues are determined in form # FP-15-01 >>>> its last update in 01/01/2022

2.8.2. Interested parties and their needs/ expectations

- The company has established a system for determining the requirement of its interested parties (internal & External) and monitoring these requirements on regular basics and checked interested parties' expectations and needs
- Updated list of interested parties and their needs and expectations were listed and checked.
- The organization established a system for determining the requirement of its interested parties (internal & External) and monitoring these requirements on regular basics and also checked interested parties' expectations and needs
- Reviewed the list of interested parties and their needs & expectations form # FP-14-01 updated 01/01/2022
- Most interested parties determined and reviewed their requirements are customers, employees, external providers, subcontractors, regulators, certifications bodies, and finances, insurance.

2.8.3. Scope of implementation

- Scope of QMS management system is described in the company policy the company (Producing Ready-made garments)
- Integrated management system is applied to all activities, processes and organizational departments and sections

No change in the scope of implementation of the quality Management systems

2.8.4. Environmental Management System (reference on processes)

- The company has established implements, maintained and continually improved its QMS.
- The QMS complies the requirements of the new standards ISO 14001:2015.
- The company has determined the process needed for its QMS
- Quality objectives were defined for each activity and supporting process and verified during the audit.
- The top management has determined resources needed for its processes and ensure their availability

LEADERSHIP: Top management shall demonstrate leadership and commitment with respect to the environmental management system

2.8.5. Leadership and commitment

- Top management had provided evidence of their commitment to the development and implementation of QMS and improved its effectiveness by:
- Ensuring the availability of needed resources.
- Authorizing QHSE policy.

Setting and authorizing the objectives and targets and follow the achievement of these objects & Ensuring that the company objectives have been deployed at all relevant

- Levels.
- Approving training plans.
- Monitoring the KPIs
- Conducting & attending annual management review meetings, & take decisions for improvements.
- Resources needed for the environmental management system are provided.
- Organization communicates the importance of effective environmental management and of conforming to the environmental management system requirements through awareness and training of employees and staff.

2.8.6. Split Parameters of Workplace Environments:

1. Climatic Environment of Meteorological Conditions
2. Textile workplace of accordance with ISO 14001 & 45001 spatial parameters [19]:
3. Job characteristics [19]:
4. Personality [19]: (Gender: Age , Female)

5. Individual environmental experience [19]:
6. Interpersonal experience [8,12]:
7. Spatial Parameters of Textiles Workplace Configuration
8. Spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 configuration:
9. Functions
10. Human activity as spatial parameters of textiles workplace variable
11. Aggregations
12. Attractors, Paths and Visibility
13. Metric elimination stage 4: Accessibility or Visibility?
14. The characteristics of textile workplace of accordance with ISO 14001 & 45001 spatial settings
15. Occupant preferences and expectations of the textile workplace of accordance with ISO 14001 & 45001 .
16. Classification of parameters affecting user satisfaction.
17. Physical comfort factors:
18. Air quality:
19. Ventilation
20. Noise control.
21. Light and daylight.
22. Functional comfort factors:
23. Privacy:
24. Concentration:
25. Communication/collaboration:
26. Psychological comfort factors:

2.8.7. Climatic Environment of Meteorological Conditions

During the Survey the climate of city is characterized by hot and dry climate. The well-distributed rainfall in the rainy season and dryness follows a typical seasonal weather pattern. The cold season is from December to February and is followed by the hot season from March to May.

The southwest monsoon season is from June to September while the period October-November constitutes the post-monsoon season. May is the hottest month with the mean daily maximum temperature at 42.7°C (108.8°F) which may even reach up to 48°c .

The Environmental Psychology is a well addressed issue in western countries, USA and Europe and implies an interface between human behavior and socio-physical environment (Wikipedia, 2010) [8] [17].

This focuses on the enquiry regarding how people experience environmental psychology of workspace.

This issue is substantially handled in western countries related to workspace design and its impact on comfort and efficiency of the users; however in conditions it is significantly neglected.

The lecture involves independent variables as measured values of ambient temperature, air velocity, relative humidity, lux levels and surface temperatures.

The dependent variables are subjective opinions of the occupants. The lecture corresponds to the category of correlation research strategy with the dichotomous framework employing the terms quantitative and qualitative analysis for five parameters as spatial parameters of textiles workplace of accordance with ISO 14001 & 45001, furniture, temperature, noise and lighting for productivity. [7,17]

A quantitative and qualitative analysis is was in Australia for air and thermal comfort of university students using drawing classes. The measurements were taken of temperature, air velocity and humidity [16] in Towards an Environmental Psychology of Workspace:

How People are affected by Environments for Work' has emphasized upon individual, group and organizational survey for office workers leading to efficiency, comfort, accuracy, speed and error lessens. [8,19]

The instruments used to measure ambient temperature, air velocity, relative humidity, lux levels is 4 in 1 environment tester of Lutron make, LM 8000, Anemometer, Hygrometer, Thermometer and Lux meter, ISO 9001, quality management system certified by SGS.

Operating temperature is 0°C to 80°C, operating air velocity is 0.4m/sec to 30m. /sec., operating humidity is Max 80% RH and light is 0 to 2200lux. Non-contact infrared thermometer is used for measuring surface temperature.

This is a non-touch measure by infrared. The temperature range is:

- 30°C to 550°C and manufactured by MEXTECH DT-8811.

IL luminance levels recommended by various global and Egyptian standards namely IESNA (Illuminating Engineers of North America) (IESNA, 2000), CIBSE (Chartered Institution of Building Services Engineers.
Analysis of User's Opinion: On parameters related to efficiency and comfort in the offices, the opinions of the sampled employees are collected through a questionnaire.
As given in the objective, the users' subjective opinions related to the parameters leading to efficiency and comfort are evaluated. [8,9]

3. RESULTS AND DISCUSSIONS:

How to Implement These Standards:

1. **Risk Assessment:** Regularly assess and identify potential hazards in the workplace. Document them and create action plans.
2. **Training:** Ensure workers are trained on safe practices, use of equipment, emergency procedures, and hazard identification.
3. **Monitoring and Reporting:** Continuously monitor workplace conditions and safety incidents. Implement a reporting mechanism to address health and safety issues swiftly.
4. **Employee Involvement:** Involve employees in safety practices, allowing them to suggest improvements and raise concerns.
5. **Audits and Reviews:** Conduct regular internal and external audits to ensure compliance with ISO standards and improve safety practices continuously.

ISO standards and best practices, textile manufacturers can create safer workplaces, reduce risks to employee health, and ensure a high standard of quality in their operations. The relationship between visual openness and Textile workplace of accordance with ISO 14001 & 45001 interaction were not consistent. For example, who focused on situation awareness, stated that the visibility of others and their behaviors allow for easy interactions and shared understanding of the overall context, while believed that physical openness does not support open communication. Another spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 variable related to the Textile workplace of accordance with ISO 14001 & 45001 layout is accessibility, the extent to which an employee's individual workspace is accessible to the external intrusions of others". However, often the only differentiation made has been whether or not the workstation was in an open setting or enclosed by a door. The application of space syntax theories and techniques, originally developed for street and neighborhood design, enables us to look into more details regarding accessibility and visibility. [19]. The analysis of building interiors using the space syntax methodology looks at lines of movement and visual fields to explain how spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 layouts affect face-to-face interactions through their effects on movement and visible corpulence. This methodology was also used to examine other features of the Textile workplace of accordance with ISO 14001 & 45001, such as the shape of floor plates.
The strength of space syntax methods is that they create a way to describe the overall layout of the Textile workplace of accordance with ISO 14001 & 45001.

However, the link between the spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 variables used in this method that is, accessibility, openness, and visibility and Textile workplace of accordance with ISO 14001 & 45001 design features (the location and size of various types of spaces in Textile workplace of accordance with ISO 14001 & 45001) is not strong.
These factors make space syntax a more powerful tool for evaluating an existing layout than for directly assisting Textile workplace of accordance with ISO 14001 & 45001 design. [19]
When we look at the changing nature of white-collar work, the trend toward interactive and collaborative work is among the biggest changes, along with more dependence on social skills.
The current workforce is specialized in terms of knowledge and skill sets and multidisciplinary and cross-functional collaboration is becoming an important element critical for the efficiency, profitability, and competitive advantage of organizations.
The value of the textile workplace of accordance with ISO 14001 & 45001 itself in stimulating successful collaboration has attracted our attention.
Though not responsible for creating actions or behaviors themselves, certain spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 settings may facilitate or inhibit desired behaviors and thus affect the use of time and energy in an organization.

The aims to explore the typology of collaborative spaces in a sample of office layouts; to develop quantitative indices that describe the distribution and amount of collaborative spaces in a textile workplace

of accordance with ISO 14001 & 45001; and to explore how well these indices predict the occupants' perception of the influence of textile workplace of accordance with ISO 14001 & 45001 layout on support for collaborative work and distractions from interactive behaviors. Identifying effective floor-plan layout variables will contribute to the theories of textile workplace of accordance with ISO 14001 & 45001 design in supporting collaborative performance. Though this lecture emphasizes the value of interaction and collaboration in the textile workplace of accordance with ISO 14001 & 45001, it is clear that most white-collar workers experience an iterative process of individual and collaborative tasks. Their ability to accomplish both types of task is important to work performance. This study of collaborative spaces in the Textile workplace of accordance with ISO 14001 & 45001 also reflects that iterative process [19].

3.1.New spatial parameters of textiles workplace variables:

Six layout-scale spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 variables are proposed in describe the distribution and number of collaborative spaces in a textile workplace of accordance with ISO 14001 & 45001. We studied their relationship to the occupants' satisfaction with the spatial parameters of textiles workplace of accordance with ISO 14001& 45001 work environment's ability to support collaboration using the following variables:

- Distance from individual workstation to nearest meeting space;
- Distance from individual workstation to nearest shared copy or print area;
- Distance from individual workstation to nearest shared kitchen or coffee area;
- Percentage of floor space dedicated to meeting spaces;
- Percentage of floor space dedicated to shared service and amenity spaces; and
- Openness.

3.2.Configuration textiles workplace of accordance with ISO 14001 & 45001:

Spatial parameters of global effects it is clear that integration, as it was originally suggested used in the overwhelming majority of studies, even if the underlying spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 models change from axial maps to room models. The various different normalizations of integration were also examined. Two more global metrics appeared in the research: intelligibility, visual entropy. Integration is however a topological metric, measuring essentially the average number of turns required to reach all places in a specific office. a few researchers made the case that using this metric for measuring the cost of traversal in realistic terms needs more nuance. Instead, metric mean depth, [13,16]

Figure1: Correlation matrix for each cell for the remaining metrics with higher (R) coefficients of correlation as darker cells. Coefficients of correlation over 0.75 in orange text. More correlated metrics are clustered closer together. **[13]**

This variety of metrics is a potentially important reason for the lack of reproducibility in the field. In cases where various physical properties are examined, there are no agreed sets of characteristics shared between the researchers meaning that what might appear important in one, could be affected by confounding factors measured in the other.

A prime example of this is connectivity, which is a completely different metric for axial models, in the former being (essentially) the number of turns available when travelling on a straight path, while for the latter the size of the visible area. If for example two meeting rooms are examined, both with a single door but one twice the size of the other, then the two connectivities would differ substantially. [13,16,18]

Functions: The functions of the various spaces were denoted as polygons on the plan encapsulating the relevant areas such as whole rooms or parts of spaces. The function names were encoded so as to be easy to reference and create hierarchies. There were five main types, workspace, circulation, meeting rooms, alternative workspaces and other facilities. In case of an open-plan workspace the encoding for each of these types there were different subcategories and levels in the hierarchy. [13,11]

- In the case of workspace, two distinct subcategories were delineated, open-plan workspace and cellular workspace.
- The demarcation of workspace was carried out with the general rule that if a room contains more than six people then it is marked as open-plan otherwise it is marked as cellular.
- Meeting rooms on the other hand have a few sub-categories, one used extensively (bookable meeting-room) and the others rarely (training spaces, event spaces).
- Spaces where staff may work or meet but are not considered workspace or meeting rooms are marked as alternative workspaces. These spaces are typically tables within workspaces or in an office where a quick meeting may be had. Other facilities include kitchens and tea-points, canteens [15,9].
- Utility rooms, gyms etc. The final category, circulation, is the marked area that remains after all else is placed in the floor. Stairs are not placed in a specific category. Outdoor areas and some inaccessible spaces such as roofs might be visible in the floor plans, especially in cases where the office resides in a campus, but are not demarcated in a specific category.

3.3.Human activity as spatial parameters of textiles workplace variable

- The potentials described in examined specifically against measurements of human activity that has been observed as single instances of people sitting, standing, moving and interacting.
- Despite the granularity of the original measurements, this lecture does not examine the behavior of a single person such as when and where they dwell or interact, rather it is interested in the behavior of the collection of people in the office and where that is located.

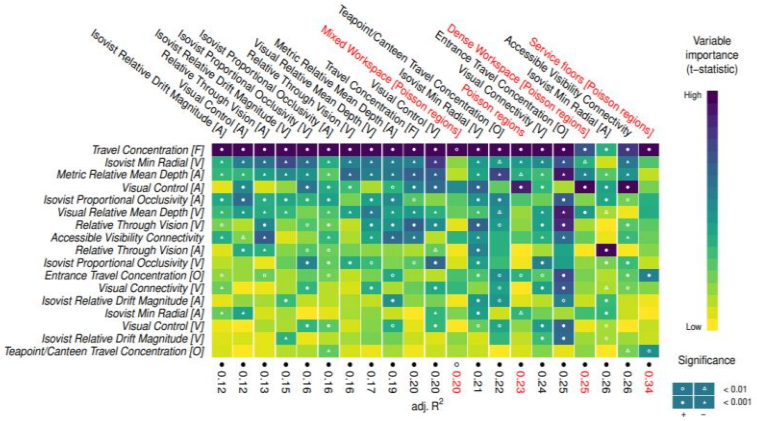

Figure 2: Binary segmented areas for movement, along with all split models (Service, Dense and Mixed workspace floors) from Poisson regions (in red text).[13]

- The focus on the collective follows the existing space syntax research which also aims to understand, puts it, the patterns, or configurations, formed by groups or collections of people. Setting the target on aggregations of people allows for extracting meaningful information about human activities avoiding the large variations and idiosyncrasies of each person's behavior.
- Instead creating a regular phenomenon that can be studied and understood statistical models that examine the relationship between the spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 metrics and the instances of activity. [13,4]

3.4.Aggregations

- the most common technique employed for comparing human activity to spatial parameters of textiles workplace of accordance with ISO14001 & 45001configuration has been aggregation of the instances of activity against the spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 metrics. The old spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 models of axial and convex maps lent themselves naturally to this method of aggregation allowing their spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 unit to act as the collector, either by matching observations of people according to their closest line or the convex space they are within.
- though some researchers did test various techniques, In many cases, even with the old spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 models aggregation was done to identify larger patterns than the ones seen per line, convex space or cell. [13]

3.5.Attractors, Paths and Visibility

- In technical terms, the process has four steps and it is carried out from the perspective of the seat, not the cell itself.
- First, the closest attractor of a specific type is chosen by measuring the metric step depth from that seat to all attractors of the same type and the shortest metric path on the grid is created from the seat to the attractor. Obstacles are taken into account given that the process happens on the accessible aspect of the model.
- The second step, the isovists of all the pixels on the path are merged together to create a zone of visibility that includes all the cells that can be seen when following that path.
- Third step, these cells are assigned a value using a decay function i.e. one that that decreases in output as the distance to the path increases. More specifically the value assigned is inversely related to the shortest straight line of visibility to the path, to take into account the cases where a cell might be seen twice in the same path. [11,13]

3.6.Metric elimination stage 4: Accessibility or Visibility?

Another dimension of the covariance and independence question is whether each of the selected metrics should be kept for accessibility or visibility.

That many of the remaining metrics are correlated between accessibility and visibility.

This is apparent both from the values of the coefficients of correlation, but also by the order of the metrics. The underlying algorithm provided by the function heat map in base clusters together the metrics that are more closely related; hence various groupings appear towards the top of the figure. Apart from the expected groupings of all the global metrics together and the local ones together it also appears that for nearly every metric its visibility and accessibility value are placed close together. This is expected as the two aspects typically grow together and thus for many cases one of the metrics growing in accessible space will mean that it will grow in visible space.

The column names signify the segmenting metric, while the row names show the effect of each metric for each model. Cells are colored based on the variable importance within the specific model. Rows are sorted based on the average t-statistic of the parameter across all models. Columns are ordered according to the highest performing model adj.

Significant parameters marked with for positive effects or for negative effects and highly significant parameters with for positive and for negative effects. Model significance also shown with the same symbols at the bottom, above the adj. Of each model. The raw output of the best performing model segmented using Accessible visibility connectivity. [13,15,16]

Occupant preferences and expectations of the textile workplace of accordance with ISO 14001 & 45001. Understanding occupants' preferences and requirements in working environment is a key driver to increase their

3.7.Classification of parameters affecting user satisfaction.

Many studies mixed physical quality and psychological or cognitive user satisfaction by using a cause and effect analytical approach. The approach basically analyses measurable human behavior and satisfaction based on physical conditions. However, perceived satisfaction is more than physical conditions. Therefore, it is important to develop a theoretical framework to determine the order of priority or the degree of importance among factors influencing user satisfaction.

- Critical frameworks for building evaluation: user satisfaction, environmental measurements and the technical attributes of building systems.
- A multidimensional post-occupancy evaluation tool.
- Satisfaction and self-estimated performance in relation to indoor environmental parameters and building features comfort of workers in office buildings: The European HOPE project.
- Occupant satisfaction as an indicator for the socio-cultural dimension of sustainable office buildings development of an overall building index.
- A model of satisfaction with open-plan office conditions: field findings.
- Quantifying occupant comfort: are combined indices of the indoor environment practicable?.
- Evaluating user satisfaction.
- Helps occupants and managers to understand the impacts of work environments on health and productivity; to analyses building systems.
- Evaluation tool for nine indoor environmental quality dimensions and occupants' satisfaction.
- Occupants in green buildings are on average more satisfied with their air quality and thermal comfort. Green offices prefer the spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 layout of open or partitioned floor plans to enclosed private offices.

- Perceived comfort is more than the indoor air quality, noise, lighting and thermal comfort responses. It also includes emotional state.
- User satisfaction for comfort parameters at workplace typologies was affected by temperature, lighting conditions, air quality, acoustics, and spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 condition and office layout.
- 18-item environmental satisfaction measure formed a two-factor structure reflecting satisfaction with: privacy/acoustics, lighting and ventilation/temperature.
- Balanced occupants' satisfaction and overall assessments about indoor environment.
- User survey instrument based on nine parameters five grade scales regarding to user satisfaction.

3.7.1. Physical comfort factors: Physical factors selected based on the relationship with biological responses to indoor climate and quality. Those factors are basic needs that may cause severe dissatisfaction and illness. Thermal comfort. Thermal comfort is subjective and depends on dynamic factors consisting of four variables: air temperature, relative humidity, relative air velocity and radiation. Although providing a place where every occupant can be fully satisfied is practically impossible, it is important to define the thermal comfort range of occupants.

Air quality: A textile workplace of accordance with ISO14001 & 45001with good air quality has an impact on the health condition and satisfaction rate of occupants. Indoor air quality (IAQ) defines the air quality related to pollutants, contaminants, and ventilation. IAQ studies have found these issues by conducting a survey about irritation, headaches, fatigue and illness, which are related to sick building syndrome (SBS) symptoms, defined the SBS as the occurrence of an excessive number of subjective complaints by the occupants of a building. These complaints include headache, irritation of the eyes, nose, and throat, lethargy, inability to concentrate, objectionable Oduors, and less frequently, nausea, dizziness, chest tightness, etc.

Ventilation: Ventilation systems play a key role for air quality, that rated buildings provided higher satisfaction levels with the air quality than rated buildings. However, that occupants' satisfaction with the air quality was relatively low during winter due to dry air and low humidity.

Stated that buildings did not necessarily affect occupants' satisfaction with the indoor environment.

In line with earlier research, occupants in more satisfied with the air quality than occupants in particularly, modern office buildings that have an automatic air handling unit without open able windows could cause occupant dissatisfaction.

Noise control: Noise has a high relevance in office building design. The effect of noise can lead to distraction and interruptions in work processes of occupants. Noise in the office normally comes from colleagues, and it often occurs in the open-plan that office noise would cause dissatisfaction with the work environment, and that the most disturbing noise source is a telephone left ringing.

-Revealed a strong relationship between noise, sound privacy and occupant satisfaction Noise performance not only has an impact on privacy but also productivity.

-For instance, open-plan offices have advantages in terms of good interaction and communication with colleagues stated that enhanced interactions in open-plan offices do not compensate for distraction from noise. However, they found sound privacy a relatively unimportant factor in overall workspace satisfaction.

-The British Standards Institution recommends a range of background noise level that is acceptable for open-plan offices of 45–50 dB and for cellular offices of 35–40 dB (Field, 2008; Standard BS 8233, 2014). In European standards, the level for the cellular office is 30–40 dB and for the open-plan office 35–45 dB.

Light and daylight: Light conditions have an impact on visual comfort and are another factor with an influence on user satisfaction. Many studies have shown the correlation between daylight and user satisfaction. That found lighting quality is important to attain user satisfaction. Found that occupants in open-plan office were provided with more light than those in cellular offices. Stated that more sun exposure was related to less depression and higher user satisfaction. The majority of office users prefer natural light over artificial light, for physical and psychological reasons [1,3,7,17].

Functional comfort factors: Functional comfort factors are related to the suitability for work activities. When those factors have the right value, users can perform the work task efficiently. User control. User control is considered as one of the important factors in relation to the cognitive aspect, since when the indoor environment is individually controlled, the user satisfaction is likely to increase.

Privacy: Has a close relationship with office layout. The privacy of office workers is better protected in an individual space than in an open-plan office. Privacy is distinguished by physical and cognitive aspects; sound privacy, visual privacy and perceived privacy, experienced by uncontrolled social contact and interruptions.

Concentration: Implies being able to focus on work. Studies dealing with concentration issues mainly compare the occupants experience between open-plan and cellular office, and investigate distracting factors. Concentration is disturbed by different elements: air quality, loud noise, and glare.
Communication/collaboration: Improvement of the communication level is connected to productivity, and leads to effective collaboration, because better information exchange between colleagues and having more contact creates more understanding of each other.

4. **Conclusion:**

By integrating the principles of ISO 14001 and ISO 45001 into textile workplace design, companies can create a safe, healthy, and environmentally friendly work environment. This not only benefits employees but also contributes to a more sustainable and responsible textile industry.

- Develop a set of spatial design guidelines for textile workplaces that prioritize worker safety, health, and well-being.
- Recommend strategies for maximizing production efficiency while minimizing environmental impact through optimized spatial configuration.
- Provide a framework for textile companies to achieve compliance with ISO 14001 and ISO 45001 standards through spatial design considerations.
- Psychological comfort factors: psychological factors are related to spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 needs such as social and spatial parameters of textiles workplace of accordance with ISO 14001 & 45001 comfort. These factors contribute to better work results and high level of satisfaction, although the absence of these factors does not mean that people are not able to work. Social contact. Establishing social contact is another factor to satisfy user demands. The definition of social contact here means interacting with other people during break or to have a chat occasionally. This parameter is highly linked to office layout and textile workplace of accordance with ISO 14001 & 45001 operation, but is not necessarily required for user satisfaction, used the concept of social and spatial parameters of textiles workplace of accordance with ISO 14001 & 45001density defined [16,18].

5. **Further Research**

- Investigate the feasibility of using digital modeling tools to design and optimize textile workplaces for OH&S and environmental performance.
- Explore the potential for incorporating sustainable building materials and practices into the design of textile facilities.
- Analyze the cost-effectiveness of implementing spatial design changes for improved OH&S and environmental outcomes in the textile industry.

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