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## Presenting a model for assessing architectural flexibility in co-working spaces

Javad Goudini \*

Assistant Professor of Architecture Department, Razi University, Kermanshah, Iran.

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### Abstract

**Background and Objective:** This paper has confirmed that coworking spaces, as one of the emerging spaces, require flexibility. However, the models presented for assessing flexibility in architectural design face two problems. The first problem is that such models have been presented for other uses such as housing, etc., and the second problem is that little effort has been made to modify and improve existing models. This paper seeks to present a model for assessing flexibility in the architecture of coworking spaces.

**Methodology:** This research, which is descriptive-analytical in nature, adopts an inductive approach and seeks to extract components for flexible collaborative work units by reviewing and analyzing existing written sources on flexibility. These sources were collected from various Persian and English fields in various disciplines (from Google Scholar and Magiran) and comparison and rational arguments were used to analyze them.

**Findings and Results:** The results showed that this research has shown that flexibility in the architectural design of collaborative work units can be assessed at three levels: general flexibility (through the ten components of changeability, ease of change, non-disappearance, consideration of uncertainty, the existence of multiple options, coordination with new requirements, no need for permanent changes, reversibility, the need for a force for change, and its solution-oriented nature); general architectural flexibility (through the three dimensions of internal/external; micro/macro; physical/spatial) and architectural flexibility related to collaborative work (at dual organizational and temporal scales).

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**Keywords:** Evaluation, flexibility, architecture, shared work units.

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\* **Corresponding Author:** [j.goudini1980@yahoo.com](mailto:j.goudini1980@yahoo.com)

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## **EXTENDED ABSTRACT**

### **Introduction:**

The contemporary lifestyle differs significantly from that of the past. This disparity is observable across all facets of life, including business. Novel technologies, the world of information, and virtual communications are merely some of the factors driving change in the business market. Since every human event has a spatial or physical counterpart, changes in businesses inevitably lead to alterations in their architecture. In recent years, influenced by this shift, new types of workspaces have emerged, among which Co-working Spaces stand out. The growing proliferation of co-working spaces in Iran and globally underscores the importance of paying attention to them. For instance, it can be stated that the number of co-working spaces worldwide has surged from approximately 160 units in 2008 to nearly 19,000 units in 2018. Furthermore, such spaces are generally regarded as suitable environments for the growth of startups and knowledge-based companies. This means that co-working spaces, by offering advantages such as providing office facilities, enhancing communications and networking, reducing costs, offering training workshops, and more, expedite the growth of knowledge-based entities. These points demonstrate the critical importance of addressing the subject of co-working spaces. Furthermore, flexibility is commonly cited as a requisite characteristic for these types of environments. The question then arises: How can the architectural spaces associated with co-working achieve the necessary flexibility? Answering this question aids architectural design projects from two key perspectives. First, it is beneficial during the design process, where the designer, by having awareness of flexibility attributes, can incorporate them into their work, thereby facilitating the advancement of the design. This trajectory is primarily pursued through the evaluation activity, which is a core function of designers, involving reflection on the design status and comparing it against the design objectives. Second, it is useful at the time of evaluating design projects after the process is completed. It should be noted that every project, upon reaching its conclusion, connects with the initiation of future projects. The essential tool linking these projects is the assessment of experiences (lessons learned). In this scenario, the critique or evaluation of the implemented approaches helps in refining directions, trends, philosophies, and requirements. In light of this, the underlying question can be reformulated as follows: What model can be employed for evaluating the flexibility of architectural design projects (with a co-working use case)?

### **Methodology:**

This descriptive-analytical research, employing an inductive approach with the aim of extracting the characteristics of flexible co-working spaces, reviews and analyzes Persian and English textual sources from various fields concerning flexibility. The process commences with the extraction of general flexibility attributes, subsequently addressing the requirements for flexibility within architectural designs and co-working units. Relevant definitions are collected and categorized into three overarching groups (various phenomena and subjects, architecture, and co-working units) from articles retrieved via Google Scholar and Magiran, using keywords such as "Flexibility." Finally, through the utilization of lexical definitions and logical reasoning, the extracted characteristics are synthesized to construct an evaluation model."

## **Results and Discussion:**

The term flexibility in English originates from the Latin root *flectere*, meaning 'to bend' or 'to fold'. Despite its considerable popularity in the engineering sciences, this concept lacks a precise, singular scientific definition and is often considered an ambiguous term. Nevertheless, cross-referencing various dictionaries reveals that flexibility, in a general sense, refers to the ability to easily change or adapt to new and shifting conditions, situations, or requirements. In more specialized domains, this concept takes on diverse meanings, including: the number of options available after a decision (in Decision Theory), methods for coping with market uncertainty (in Management), or the capacity to adapt to changing environments (in Manufacturing). This multiplicity of definitions suggests that, rather than providing a single comprehensive definition, one should focus on the characteristics and commonalities across these definitions. An examination of numerous definitions highlights shared features for any flexible phenomenon. The first characteristic is the capacity for transformation or the ability to change, which is present in most definitions. A second vital characteristic is that this transformation must occur without deterioration or loss of function of the phenomenon. The third indicator is the ease of change; meaning the transformation must take place with speed, easily, and with minimal effort, time, and cost."Furthermore, flexibility consistently gains value when confronted with uncertainty (changing and unpredictable conditions) and by offering multiple options (diverse responses and solutions). The flexible phenomenon essentially emerges as a solution to address varying requirements and needs. Other identified characteristics include the non-necessity of permanent changes (using temporary components) and, ultimately, the reversibility to the initial state. Flexibility in architectural designs can be examined from several perspectives. On one hand, flexibility can be evaluated in relation to the interior of the design (internal domain) or in relation to the exterior of the design (external domain). In the internal aspect, capabilities such as versatility (diverse uses of space), adaptability (harmonizing with new conditions), and convertibility (separation or consolidation of space) are significant. In the external aspect, the expandability and capacity for the design's growth are pertinent. From another perspective, the flexibility of a design can be assessed at the macro level (the entire structure) or at the micro scale (components and sub-spaces). Moreover, this characteristic can be investigated and pursued in the physical elements of the architectural design (such as the use of movable elements, modular systems, or flexible furniture) or in the spatial aspects (such as spatial relationships and behavioral patterns). Co-working spaces transcend conventional office environments or home-based work, emphasizing the sharing of both physical and intellectual space among individuals from different organizations, without adherence to a single unified structure. These spaces mandate a high degree of flexibility to meet the diverse and evolving needs of their occupants. These needs and conditions are inherently unforeseen; consequently, co-working spaces are often described as hyper-flexible, multi-functional, or multi-purpose environments. This flexibility must exist at a minimum of two scales: the organizational scale (to adapt to the differing number and type of organizations with varying structures) and the temporal scale (to accommodate various periods of space utilization, whether hourly, daily, or monthly). This inherent flexibility facilitates the effective sharing of space and the establishment of a suitable work community."

**Conclusion:** The results showed that this research has shown that flexibility in the architectural design of collaborative work units can be assessed at three levels: general flexibility (through the ten components of changeability, ease of change, non-disappearance, consideration of uncertainty, the existence of multiple options, coordination with new requirements, no need for

permanent changes, reversibility, the need for a force for change, and its solution-oriented nature); general architectural flexibility (through the three dimensions of internal/external; micro/macro; physical/spatial) and architectural flexibility related to collaborative work (at dual organizational and temporal scales).

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### **Authors' Contribution**

Authors contributed equally to the conceptualization and writing of the article. All of the authors approved the content of the manuscript and agreed on all aspects of the work declaration of competing interest none.

### **Conflict of Interest**

The authors declare no conflict of interest.

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