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Lean-Ability and Sit-Ability: A Study of Users' Adaptive Behavior in the Gazebo Space of a Semi-Open Restaurant

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***Abstract*: Comfort is a crucial aspect in restaurant interior design, particularly in floor-seating areas of semi-open restaurants that rely on the flexibility of user interaction with spatial elements. This study aims to evaluate *lean-ability* and *sit-ability* as forms of adaptive affordance in the gazebo (saung) zone, by examining user behavior during group dining activities. The methods employed include visual observation and brief interviews with 15 respondents who directly interacted with interior elements such as the floor, table, railing, and pillars. The findings reveal those variations in sitting postures—such as reclining, cross-legged sitting, and semi-lying positions—as well as the habit of leaning on surrounding elements, are influenced by users' physical conditions, spontaneous comfort, and social dynamics within the group. These results emphasize the importance of considering actual affordances in designing adaptive dining spaces that support users' comfort and behavior.**

***Keywords*: lean-ability, sit-ability, affordance, semi-open restaurant, gazebo space, comfort.**

1. Introduction

Affordance is a key concept in interior design as it allows spaces to adapt to the needs and behaviors of users. This concept is defined as the potential actions offered by the environment [1], and the perception of affordance plays a critical role in shaping how users interact with spatial elements [2]. In interior design, affordance contributes to the creation of intuitive spaces that promote comfort [3].

Floor-seating spaces such as gazebos (*saung*) are culturally and functionally distinctive semi-open environments**.** In the absence of conventional furniture, users interact directly with elements like the floor, table, and railing. The comfort of sitting and leaning largely depends on the users' ability to adjust to the conditions of the available elements [4]. *Lean-ability* and *sit-ability* as forms of actual affordance emerge from users' real responses to physical and social needs within the space [5].

This study evaluates how *lean-ability* and *sit-ability* are formed through users' spontaneous interactions with interior elements in the gazebo space, and how these affordances contribute to dining comfort. The findings aim to serve as a foundation for developing more adaptive and contextual interior design strategies, particularly in creating inclusive and flexible spaces that accommodate diverse comfort needs.

2. Literature Review

A. *Affordance Theory*

Affordance is a fundamental concept in user behavior-based design, first introduced by Gibson as the potential actions enabled by an object or environment in relation to the organism perceiving it [1]. In the design context, Norman further developed this concept into two main categories: *perceived affordance* what appears possible to do and *actual affordance* what can actually be done by users with a particular element [2].

McGrenere and Ho emphasized the importance of distinguishing between the two, as not all visually perceived affordances are truly usable by the user [3]. In this study, affordance is used to analyze two dominant forms of interaction within the gazebo (*saung*) space: *lean-ability* (an element's ability to support leaning positions) and *sit-ability* (an element's ability to accommodate various flexible sitting positions). These two affordances become the main focus to assess the extent to which interior elements can adapt to users' physical comfort needs.

B. *User Behavior in Space*

User behavior in space is strongly influenced by the physical and social environment in which activities take place. According to Barker, human behavior is shaped by behavior settings, which are recurring patterns of place, activity, and actors within a given context [6]. Zeisel adds that spatial behavior can be observed through how users respond to interior elements, both functionally and emotionally [4].

In the context of floor-seating dining spaces such as the saung, varied sitting postures and leaning habits represent adaptive responses to the absence of conventional furniture and the need for comfort. Rapoport also suggests that cultural and social context shapes users' spatial interactions, which is why this study's affordance analysis considers the socio-cultural dynamics involved.

C. *Spatial Comfort in Floor-Seating Contexts*

Vischer states that comfort in interior spaces involves not only physical aspects such as temperature, sitting posture, and

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surface materials, but also psychological comfort related to feelings of safety and relaxation [5]. In floor-seating spaces, elements such as flooring, cushions, and the availability of structural support become crucial factors in providing comfort.

Previous studies have shown that comfort does not always stem from formal interior design elements, but often emerges from the users' adaptive interaction with existing conditions. Therefore, in this study, affordance is positioned as a mediator between the physical characteristics of interior elements and the users' perception of comfort.

D. Interior Design of Gazebo and Semi-Open Spaces in Tropical Settings

The *saung*, as part of a semi-open design, uniquely combines natural elements with simple architectural structures. Typically, these spaces are not equipped with formal furniture such as chairs or sofas, but rather rely on flooring and structural elements to support user activities. In tropical climates, semi-open spaces like the *saung* offer advantages in terms of natural ventilation and lighting. However, they also pose challenges in ensuring seating and leaning comfort.

3. Research Methods

This study employs a descriptive qualitative approach to explore adaptive affordances namely *lean-ability* and *sit-ability* as manifested in users' interactions with interior elements within the gazebo (*saung*) area of a semi-open restaurant. This approach is deemed appropriate because it can uncover the contextualized, in-depth meanings of users' spatial behaviors [7]. The research was carried out at Taman Indah Sari Resto in Semarang, focusing on the *saung* zone a floor-seating area without conventional chairs, which allows flexibility in sitting and leaning postures. The subjects comprised 15 family-group members who were purposively selected based on their active engagement in dining activities and interaction with the interior elements. Data-collection techniques included visual observation of sitting and leaning behaviors, questionnaires and brief interviews to understand users' reasons and comfort perceptions, and visual documentation (photos and videos) to supplement field data. Data were analyzed in three stages: first, behavioral coding to categorize types of user interaction; second, affordance mapping using a Feature-Affordance Matrix to classify *sit-ability* and *lean-ability*; and third, comfort validation through interview and questionnaire results to assess whether the identified affordances genuinely support both physical and psychological comfort. This methodology draws on Gibson's concept of affordance [1], Norman's distinction between perceived and actual affordances [2], Vischer's framework of spatial comfort [5], Barker's behavior-setting theory [6], and Creswell's principles of thematic qualitative analysis [7].

4. Results and Discussion

A. Observation Results and High-Affordance Matrix

This study utilized the Function-Task Interaction (FTI) method, consisting of eight tasks (T1–T8), to explore user interactions with interior elements in a semi-open restaurant. Each task represented common activities from waiting to taking group photos performed as part of the group dining experience. The tasks are:

1. T1: Waiting (Zone A)
2. T2: Walk to the gazebo (Zone B)
3. T3: Look at menu, ordering food, eat (Zone D)
4. T4: Wearing shoes (Zone B)
5. T5: Walk to Area A (Zone D)
6. T6: Eating snacks, chatting (Zone A)
7. T7: Walk to Area C (Zone D)
8. T8: Group picture and chatting (Zone C)

Through two stages of visual observation, affordances such as *sit-ability*, *lean-ability*, *support-ability*, *walk-ability*, and *place-ability* were found to consistently emerge.

ZONE	ELEMENT	Walk-Ability	Sit-Ability	Lean-Ability	Push-Ability	Pull-Ability	Kick-Ability	Hug-Ability	Touch-Ability	Hold-Ability	Swing-Ability	Place-Ability	Information Access-Ability	Look-Ability	Lie-Ability	Step-Ability	Support-Ability	Throw-Ability	Hang-Ability	Stand-Ability	Grab-Ability	Affordance Total per-Elements
Zone A	Concrete Flooring	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	4			11
	Wooden-backrest chair	0	9	8	8	6	1	0	2	1	1	1	0	2	0	0	2	0	2	0		43
	Meja Makan Standar Material Kayu	0	0	7	0	0	0	0	2	0	0	6	0	0	0	0	8	0	0	0	0	23
	Pole	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2
	Food Stand	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Zone B	Ceramic Flooring	4	6	2	0	0	0	0	0	0	0	3		2	1	2	8	0	0	4	0	32
	Steel Railing	0	0	4	0	0	0	0	0	2	0	0	0	0	0	0	3	0	0	0	0	9
	Low Height Dining Table	0	0	4	0	0	0	0	0	1	0	4	0	0	0	0	4	0	0	0	0	13
	Cushion Seating Pad	0	4	2	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	2	2	12
	Pole	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	Sink	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Zone C	Chair with Cushion	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7
	Grass Flooring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
	Steel Railing	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Zone D	Floor	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
	Stairs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
	Gazebo Numbering	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	4
Affordance Total		16	24	28	8	6	2	1	4	4	1	15	2	7	1	4	28	1	2	14	4	

Fig. 1. Affordance-Feature matrix

Sit-ability was the dominant affordance across nearly all zones, facilitated by chairs, ceramic floors, and floor seat cushions. *Lean-ability* and *support-ability* were frequently utilized through tables, chairs, railings, and even the floor. *Place-ability* was identified in elements such as tables and chairs, especially when the floor was unsuitable due to dirt or moisture. *Walk-ability* remained active along floors and transitional areas between zones.

The Affordance Feature Matrix revealed that wooden chairs had the highest frequency of user interaction, followed by the floor and tables. Meanwhile, the High-Affordance Matrix highlighted several perceived (deviant) affordances in yellow, such as leaning on tables or placing bags on chairs—actions still performed by users due to the limited availability of supportive elements. These findings affirm that affordances are not solely determined by initial design, but also by user context and perception.

B. Lean-Ability Findings

Lean-ability emerged as a spontaneous response to the users' need for both physical rest and social ease while waiting for food, chatting, or simply spending time within the space. Elements such as tables, wooden railings, structural pillars, chairs, and even the bodies of fellow users were commonly utilized as informal supports. In the saung zone characterized by low tables and floor seating users frequently leaned against the surrounding railing or rested their backs on low tables, despite these elements not being originally designed for that purpose. This aligns with Gibson's assertion that affordances

are not solely inherent in objects, but exist through the relationship between user and environment [1]. Thus, lean-ability is not a fixed function but emerges situationally through user perception and behavior.

		AFFORDANCES				
		Lean-Ability	*Support-Ability*	*Sit-Ability*	*Walk-Ability*	*Place-Ability*
Interior Element	Wooden-backrest chair	Yes	Yes	Yes	No	Yes
	Ceramic Floor	Yes	Yes	Yes	Yes	Yes
	Standart Dining Table	Yes	Yes	No	No	Yes
	Low Height Dining Table	Yes	Yes	No	No	Yes
	Cushion Sitting Pad	Yes	No	Yes	No	No

Fig. 2. High-Affordance matrix

Fig. 3. The tendency to lean the body forward during interactions with one another

Leaning behavior enhanced not only postural relief, especially during prolonged sitting or waiting, but also reinforced social comfort by enabling relaxed, non-verbal communicative postures. Gifford noted that physical posture is a key expression of social interaction in space, and leaning can reflect both openness and informal engagement [8]. In some cases, lean-ability manifested as socially co-created support, such as when users leaned against their companions while talking. This illustrates that affordance can be co-constructed, extending beyond fixed spatial elements into shared social behavior [2].

Fig. 4. The tendency to lean the body to elements while relaxing

Furthermore, design limitations often played a role in triggering alternative lean-ability strategies. For instance, when chairs lacked backrests or appropriate ergonomics, users instinctively sought alternative supports leaning on tables, structural posts, or walls. This adaptive behavior reinforces the importance of designing for functional redundancy and flexibility in informal seating environments, as emphasized by Vischer, who suggests that comfort arises not only from physical form but from a space's capacity to accommodate varied user needs and behaviors [5].

Material and spatial characteristics also influenced lean-ability. Elements that were flat, stable, and positioned at the right height such as wooden railings or table edges were preferred over unstable or rounded surfaces. This observation aligns with McGrenere and Ho's distinction between perceived and actual affordance, where user interaction is guided by immediate visual cues about what an object can support [3].

These findings highlight that lean-ability should not be dismissed as misuse or accidental interaction. Instead, it presents a design opportunity: to integrate subtle, multi-functional support features into the layout such as extended tabletops, low railings, or structural backrests that also function as dividers or anchors. As Zeisel suggests, design that anticipates real behavior even beyond its intended use can improve environmental responsiveness and user satisfaction [4].

Ultimately, lean-ability reflects the human-centered adaptability of space. Recognizing and facilitating such spontaneous behaviors not only improves physical comfort but enhances the inclusive and flexible character of communal environments like semi-open restaurants.

C. Lean-Ability Findings

The saung zone (gazebo) was the primary space where various forms of sit-ability were observed, including sitting with legs outstretched, cross-legged, kneeling, and even lying

down in a relaxed posture. These variations emerged as spontaneous, adaptive responses to the users' physical needs, personal preferences, and cultural norms associated with floor-seating environments. According to Rapoport, cultural settings strongly influence spatial behavior especially in informal environments where users are free to express bodily comfort based on their own conventions and expectations [9].

Fig. 5. Variations of sitting postures in the Saung (gazebo)

Respondents with specific health conditions, such as gout or joint stiffness, reported that sitting with legs extended provided more relief and reduced discomfort compared to using upright chairs which typically enforce a more rigid posture. This finding aligns with Zeisel's assertion that users often seek postures that allow them to release muscular tension and support their bodily state, particularly in semi-formal settings like group dining spaces [4].

While seat cushions (or floor cushions) enhanced comfort by adding a layer of softness and reducing the pressure of sitting directly on hard surfaces, they were not sufficient to fully overcome the limitations of cold ceramic flooring, especially for female users. Several female respondents noted discomfort due to the cold surface, as well as the limited size of cushions that did not fully support their lower limbs or hips. Vischer points out that thermal comfort and surface temperature are critical components of environmental satisfaction, particularly when bodily contact with the floor is sustained for long durations [5].

These observations show that sit-ability is not solely a product of seating geometry or availability, but also of material properties, bodily responses, and gender-specific comfort factors. Women, for example, tend to experience higher sensitivity to cold or hard surfaces, which can influence their preferred posture and interaction with the space.

Fig. 6. Variations of leaning postures in the Saung (gazebo)

Furthermore, the flexibility of posture observed in the saung zone reflects an embodied affordance a dynamic interaction between the user's body, cultural norms, and environmental offerings. This aligns with the idea that affordance is not static but interpreted and enacted through the body. In this context, sit-ability becomes not just a passive function of the seat, but an active manifestation of user agency in responding to both comfort and environmental constraints.

Therefore, designing for enhanced sit-ability in floor-seating spaces involves more than providing soft surfaces; it requires understanding user diversity, ergonomic variation, and material-environment interaction. Providing larger, thermally insulating cushions, textured rugs, or low modular backrests may significantly improve the user experience in such communal spaces.

D. Comfort Analysis and User Validation

Based on the results of questionnaires and interviews, both physical and social comfort were found to be significantly influenced by the clarity of affordances and the availability of supportive elements. Elements such as chairs with backrests and floor seat cushions were consistently rated as the most comfortable, with average questionnaire scores exceeding 4 on a 5-point Likert scale. This reflects users' preference for elements that offer clear, perceived affordances aligned with their intended function such as sitting or reclining comfortably. As Norman suggests, perceived affordances that are easily understood and visible help guide intuitive user behavior and reduce discomfort or misuse [2].

However, comfort declined when users were forced to rely on perceived or improvised affordances such as placing bags on dining tables or chairs which disrupted the primary functional role of these elements. This behavior was not arbitrary; it emerged from a lack of alternative options, particularly for bag storage or resting items during meals. McGrenere and Ho emphasize the need to distinguish between perceived and actual

affordance, as users often take action based on what appears to be usable in the absence of dedicated features [3].

Fig. 7. Questionnaire Answers - the comfort of the chair when used for sitting while holding or sharing space with personal belongings

Gender differences also emerged as a notable factor influencing comfort. Several female participants reported discomfort from sitting for extended periods on cold ceramic floors, even when cushions were provided. The thermal discomfort, in combination with inadequately sized seat mats, often failed to support the lower body adequately, particularly the hips and legs. Parsons explains that thermal conditions, material contact, and body posture contribute to perceived discomfort, with women generally exhibiting higher sensitivity to cold and pressure-related fatigue [10].

Fig. 8. The placement of personal belongings in ways that do not align with the original function of the element

Additionally, interviews revealed that users frequently relied on adaptive affordances due to infrastructural limitations. For example, users leaned against tables or railings not because they were intended for that purpose, but because of the absence of ergonomic backrests or dedicated leaning surfaces. This supports Vischer's framework, which distinguishes between functional comfort related to physical support and psychological comfort, which includes feelings of spatial appropriateness and ease [5].

Importantly, these adaptive affordances, such as lean-ability and place-ability, should not be interpreted as negative deviations. Instead, they represent evidence of spatial flexibility and user ingenuity, illustrating how people negotiate their needs within the constraints of the environment. Gifford argues that the real success of a space lies not only in how it is intended to function, but in how effectively it accommodates the unpredictable nature of human behavior [8].

These findings emphasize that comfort and spatial effectiveness are not determined solely by the designer's original intent but by the capacity of interior elements to respond to dynamic, real-world user behaviors. Therefore, the interior design of semi-open restaurants especially those with communal or floor-seating arrangements should proactively accommodate spontaneous affordances, such as flexible storage options, thermal-responsive materials, and postural support elements. By doing so, designers can foster more inclusive, adaptive, and contextually responsive environments that improve the quality of user experience over time.

5. Conclusion

This study reveals that adaptive affordances such as lean-ability and sit-ability play a vital role in shaping comfort within semi-open dining spaces, particularly in the saung zone. Users' interactions with interior elements such as tables, railings, flooring, and seat cushions resulted in diverse and spontaneous sitting and leaning behaviors, reflecting both spatial flexibility and the users' physical and social comfort needs. The findings indicate that affordances are not always fixed, but rather emerge and evolve depending on environmental context, user perception, and bodily needs.

The Function-Task Interaction (FTI) method enabled contextual identification of affordances based on users' real-life activities, while the High Affordance Matrix analysis showed that elements like ceramic flooring and seat cushions were key in supporting flexible sitting arrangements although their effectiveness remained dependent on material characteristics and environmental conditions. Validation through interviews and questionnaires reinforced that the observed affordances contributed to user comfort, but also highlighted challenges such as limited space for placing personal items and the floor's lack of thermal comfort.

Thus, this study underscores the importance of designing spaces that go beyond fulfilling formal functions to also being responsive to users' adaptive behaviors. These findings can inform interior design strategies that are more inclusive, flexible, and context-sensitive, especially in supporting informal social activities such as communal dining.

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