

# Modular & Adaptive Seating in Bakehouses: Designing for Small & Large Crowds

Bhavna Ahuja<sup>1</sup>, Ar. Arpita Das<sup>2</sup>

<sup>1</sup>Student, Amity University Chhattisgarh

<sup>2</sup>Assistant Professor, Amity University Chhattisgarh

## Abstract

This research explores Bakehouses today face dynamic user traffic—from small and large crowd demanding seating systems that are flexible, functional, and space-efficient. It will explore how modular and adaptive seating can be effectively integrated into bakehouse environments to accommodate both small gatherings and large crowds.

The paper analyses seating as a spatial and social element, focusing on how ergonomic comfort, mobility, and configuration logic can enhance user experience and operational flow. Drawing inspiration from modular furniture traditions and case studies like IKEA, Damro, Godrej Interio, and Pepperfry, the study highlights how adaptable systems can balance aesthetics, durability, and reusability.

An important aspect of the investigation is joinery techniques—from slot-tab friction systems to knock-down (KD) hardware—which allow tool-less assembly, repetitive use, and easy transport. By embedding sustainable materials and ergonomic data into modular seating prototypes, this study envisions how future bakehouses can evolve into highly flexible, user-centric social hubs through thoughtful furniture design.

By combining modular design, smart material selection, and responsive joinery logic, this study presents a holistic design framework for future-ready bakehouses. It emphasizes that when seating is thoughtfully designed, it goes beyond accommodating crowds—it fosters community, enhances spatial fluidity, and builds brand identity. The conclusion positions modular seating not as a technical afterthought, but as a central design strategy in shaping inclusive, flexible, and engaging food spaces.

**Keywords:** Modular seating, Adaptive furniture, Bakehouse interiors, Flexible seating design, Space optimization, Ergonomics, Multi-functional furniture, User-centered design, Small space solutions, Interior design innovation.

## Introduction

The evolving nature of food spaces like bakehouses has turned furniture into more than just a functional necessity—it is now central to shaping spatial experience, user interaction, and brand identity. Traditional static seating often fails to meet the fluctuating demands of modern bakehouses, where the same space may need to host a family brunch in the morning, a solo reader mid-afternoon, and a community workshop in the evening.

Modular and adaptive seating systems offer a solution to this complexity. They enable quick reconfigurations, support multiple functions, and are grounded in ergonomic principles that cater to diverse body types, usage postures, and comfort levels. This research delves into seating systems designed

---

2

dimensions, allows a seating unit to be comfortable for all users, including children, the elderly, or those with physical constraints.

### 2.3 Modular Seating & Public Spaces

In the context of public spaces whether indoor cafés or outdoor plazas seating is more than a functional element. It plays a social and psychological role in shaping how people interact with the environment and with each other. Modular seating systems, which can be rearranged into different layouts (linear, circular, scattered), enable spontaneous interactions, promote inclusivity, and support diverse user needs.

The transition from fixed benches and single-use layouts to fluid, reconfigurable arrangements mark a significant shift in how we perceive and design public interiors. These systems allow for seasonal, event-based, or user-driven changes, especially valuable in commercial environments like bakehouses where the same space might host different crowd sizes across the day.

### 2.4 Modular Seating & Public Spaces

#### The Role of Modularity in Shaping User Interaction

Modular seating has transformed how we perceive and interact within public spaces. Its inherent flexibility enables designers to create dynamic environments that respond to the fluidity of human behaviour. In settings such as plazas, cafes, libraries, or community centres, modular systems encourage users to engage with the furniture actively rearranging elements to suit personal comfort or group interactions.

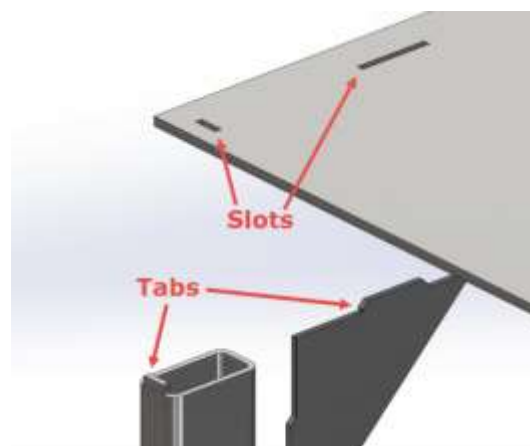
These systems foster inclusivity and democratic space usage, as people from different backgrounds or age groups can claim their own corner or join others seamlessly. The potential for personalization enhances the user experience, allowing spaces to be playful, contemplative, or collaborative depending on the configuration.

Additionally, modular seating helps activate underutilized areas, giving new life to spaces through simple rearrangements. This approach to design promotes sustainability, adaptability, and community involvement, redefining public interiors as responsive and evolving habitats.\

## 3. Joinery Study in Modular Furniture-

Joinery is the backbone of modular furniture design as it determines how easily pieces can be assembled, disassembled, and adapted. The right type of joinery not only enhances durability but also defines how flexible and user-friendly the furniture is. In bakehouse interiors, where reconfiguration and space optimization are essential, joinery systems play a vital role.

### 3.1 Slot & Tab Joinery



**Fig 2 Slot And Tab Joint**

Slot & tab joinery is one of the most intuitive systems used in modular furniture. It involves precision-cut components that slide into matching slots, forming a tight, tool-free connection. This friction-fit mechanism allows for quick assembly and disassembly — ideal for flat-pack stools, display stands, and public seating areas that require mobility and ease of setup.

In bakehouses, slot & tab systems are perfect for temporary seating zones, pop-ups, or workshops where flexibility is key. The clean, geometric forms created through this method also lend a contemporary edge to interiors.

### 3.2 Cam Lock & Dowel

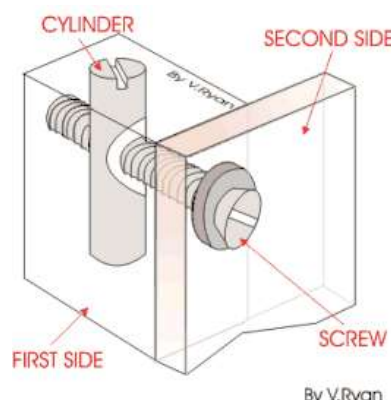


**FIG 3 Cam Lock & Dowel**

A popular joinery system made famous by IKEA, the cam lock and dowel mechanism offer a strong semi-permanent connection that balances aesthetics with functionality. Wooden dowels are inserted into pre-drilled holes for alignment, while metal cam locks tighten and secure the joint.

This system is especially useful for seating or storage units that are not frequently reassembled but may require a clean, concealed finish. In bakehouses, it suits semi-fixed furniture like booth seating or compact service counters — areas where durability and a polished look matter most.

### 3.3 Knock-Down (KD) Hardware



**FIG 4 Knock-Down (KD) Hardware**

KD joinery systems use mechanical fasteners like bolts, barrel nuts, and brackets to create robust, reconfigurable connections. Designed for repeated assembly without wear, KD systems are a go-to choice for commercial bakehouse furniture, especially in high-traffic areas where furniture may need frequent moving or rearranging.

The ability to take apart and reassemble without compromising strength makes KD hardware perfect for

modular seating, workstations, or café tables. While it requires basic tools for installation, its strength and versatility make it ideal for long-term use in professional environments.

## Joinery comparison of 3 commonly used joinery.

Joinery Comparison	Slot & Tab	Cam Lock & Dowel	KD Hardware
<b>Assembly Speed</b>	Very Fast (Quickest)	Moderate Speed	Slow (Requires precise alignment)
<b>Reusability</b>	High Reusability	Low (Weakens after disassembly)	Very High (Built for repeated use)
<b>Transport Friendliness</b>	Excellent (Flat-packable)	Good	Limited (Bulky hardware)
<b>Cost Efficiency</b>	Very Cost-Effective	Moderate	Less Cost-Effective (Hardware adds cost)
<b>Customizability</b>	Highly Customizable	Limited	Highly Customizable

*Table of joinery comparison*

## 4. Case Studies

### 4.1 IKEA India – Modularity Meets Minimalism



**FIG 5 IKEA India ARMCHAIR**

IKEA India brings to the table a unique blend of high modularity and modern aesthetics, making it a favourite for dynamic and compact bakehouse settings. Known for its flat-pack systems, IKEA's furniture can be effortlessly assembled, rearranged, or expanded — offering a perfect solution for cafés and pop-up bakehouses that often need seasonal flexibility or mobile setups.

Popular product lines like the EKEDALEN extendable tables and NORRÅKER chairs are designed to adapt with changing needs. Their clean lines and compact form suit contemporary interiors, while the brand's commitment to sustainability adds value for environmentally conscious spaces. IKEA's approach promotes modular thinking without compromising comfort or user experience.

#### 4.2 Godrej Interio – Built for Commercial Efficiency



**FIG 6 Godrej Interio Chair**

Godrej Interio stands out for its strong focus on commercial-grade performance. With a design ethos centered around ergonomics and functionality, it delivers seating systems that are robust and space-conscious. Their offerings include stackable chairs, foldable tables, and nesting stools, all crafted to withstand the wear and tear of high-footfall environments like busy bakehouses.

Designed with space optimization in mind, these pieces are ideal for dynamic layouts where customer flow varies through the day. Their finishes are easy to clean and maintain, which is crucial in food-service environments. Godrej products are not just practical — they support operational efficiency without losing sight of comfort.

#### 4.3 Pepperfry – Aesthetic-Driven Modularity



**FIG 7 Pepperfry SOFA**

Pepperfry is a design-forward brand that caters to bakehouses with a strong visual identity. Although not as modular in a technical sense as IKEA or Godrej, Pepperfry offers a wide variety of folding, stackable, and mix-and-match furniture that allows café owners to craft eclectic, theme-based interiors.

The brand is known for its rustic, industrial, and bohemian-styled pieces — ideal for bakehouses wanting to stand out visually and attract a design-conscious crowd. Materials like mango wood, metal, and engineered timber are frequently used to bring warmth and character into the space. While not all pieces are suited for heavy-duty use, they excel in creating inviting atmospheres and Instagram-worthy seating zones.

#### 4.4 DAMRO Furniture – Traditional Strength, Limited Flexibility

DAMRO is one of South Asia's established furniture brands, known for sturdy, affordable wooden furniture. In the context of bakehouses, DAMRO's offerings work best in traditional-style cafes or seating zones with less emphasis on modularity. Their product range includes compact dining sets, sofas, and side tables that blend well in cozy, homely settings.





**FIG 8 DAMRO Furniture sofa 2-seater**

However, the modular potential is quite limited — most pieces are pre-assembled and not designed for reconfiguration. What DAMRO lacks in flexibility, it makes up for in durability and warmth, especially through the use of solid wood and veneer finishes. For bakehouses that value a classic look and don't require frequent layout changes, DAMRO provides a reliable and cost-effective choice.

## 5. Joinery Applications in Case Studies

- **IKEA India**

Uses Cam Lock & Dowel joinery for tool-friendly, semi-permanent furniture. Ideal for compact, pop-up bakehouses with a clean finish and easy setup.

- **Godrej Interio**

Relies on Knock-Down (KD) Hardware — bolts, brackets, and screws — built for durability and frequent reconfiguration in high-traffic commercial bakehouses.

- **Pepperfry**

Combines mixed joinery (dowels, bolts, hidden fasteners). Moderate modularity, suited for aesthetic-driven bakehouses with occasional layout changes.

- **DAMRO Furniture**

Features fixed joinery (glued dowels, nails, screws) and Knock-Down (KD) Hardware bolts, brackets, and screws. but strong and reliable, best for static seating zones in traditional-style bakehouses

## 6 Analysis of Case Studies-

Parameter	IKEA India	Godrej Interio	Pepperfry	Damro furniture	Findings
<b>Modularity</b>	Highly modular, adaptable components	Strong modular logic for commercial use	Moderate modularity with creative flexibility	Fixed but functionally combinable in layout	All brands support flexibility to varying degrees, enhancing spatial planning
<b>Assembly &amp; Portability</b>	Easy self-assembly, highly portable	Semi-assembled, easy to move and rearrange	Easy setup with foldable options	Ready-to-use; simple setup	All offer convenient setup suited for different user needs
<b>Aesthetic Appeal</b>	Minimal, modern, and universally	Sleek and functional for professional	Rustic, industrial, and eye-	Classic, warm, and inviting	Each brand caters to different visual themes supporting a

	appealing	spaces	catching styles	aesthetics	variety of bakehouse styles
<b>Durability</b>	Durable for light to moderate commercial use	Sleek and functional for professional spaces	Good for medium-use interiors	Very sturdy for long-term use	All ensure longevity in design when matched to the right setting
<b>Suitability for Bakehouses</b>	Deal for modular cafés and compact layouts	Excellent for high-traffic food outlets	Great for concept cafés and visual storytelling	Suitable for fixed cozy café lounges	Each brand fits a different style and scale of bakehouse setup

**Table -2 Analysis of Case Studies**

- IKEA India stands out for its high modularity, allowing for quick reconfiguration and space-saving layouts. The brand's sleek, flat-pack designs are well-suited for modern bakehouses where flexibility and clean design are priorities.
- Godrej Interio is a leader in commercial-grade furniture, offering robust and ergonomic solutions ideal for high-traffic spaces. Their stackable and folding elements enable spatial efficiency without compromising strength.
- Pepperfry stands out for its design-focused furniture that blends visual appeal with a fair level of modular flexibility. It's best suited for bakehouses that focus on creating a distinctive atmosphere with aesthetic-forward seating arrangements.
- DAMRO Furniture is known for its affordability and long-lasting wood craftsmanship. While not heavily modular, its pieces are perfect for static zones, bringing a warm, traditional character to the space.

## Conclusion

Modular and adaptive seating plays a vital role in shaping flexible, functional, and user-friendly interiors especially in dynamic spaces like bakehouses. As customer expectations evolve and crowd sizes fluctuate, the ability to reconfigure seating quickly and efficiently becomes essential.

By integrating smart joinery systems and space-saving solutions, designers can create environments that are not only comfortable and efficient but also visually appealing and sustainable. Whether it's a compact bakehouse or a large experience centre, modular design supports seamless transitions, enhances customer experience, and improves overall space utilization.

In essence, thoughtful seating design is more than just placing furniture. It's about enabling interaction, adaptability, and long-term usability in modern commercial interiors

## References

3. [https://www.archdaily.com/1027386/are-modular-seating-systems-redefining-our-perception-of-public-spaces?ad\\_source=search](https://www.archdaily.com/1027386/are-modular-seating-systems-redefining-our-perception-of-public-spaces?ad_source=search)
4. [https://www.researchgate.net/publication/286048663\\_Design\\_Development\\_of\\_multipurpose\\_space\\_saving\\_seating\\_arrangements\\_using\\_Ergonomics](https://www.researchgate.net/publication/286048663_Design_Development_of_multipurpose_space_saving_seating_arrangements_using_Ergonomics)
5. <https://mentoredengineer.com/wp-content/uploads/2021/01/Proper-Tab-and-Slot-Design-and-How->



to-Avoid-Serious-Issues.pdf

6. <https://www.ikea.com/in/en/cat/tables-chairs-fu002/>
7. <https://www.damroindia.com/>
8. <https://www.pepperfry.com/>
9. <https://www.godrejinterio.com/>
10. <https://www.iiad.edu.in/the-circle/importance-of-ergonomics-in-interior-architecture-design/>
11. <https://www.zadinteriors.com/blog/modular-furniture-pros-cons/>

### Sources of Figures

1. **Figure 1** – Modular Furniture Sketch
2. **Figure 2**- <https://technologystudent.com/images2/scanfit1.gif>
3. **Figure 3** [https://cabinet.titusplus.com/assets/Connectors/System5/QuickfitTL5/Titus-TL5-BLACK-isolated-RGB-PREVIEW-01\\_\\_ScaleMaxWidthWzgwMF0.png](https://cabinet.titusplus.com/assets/Connectors/System5/QuickfitTL5/Titus-TL5-BLACK-isolated-RGB-PREVIEW-01__ScaleMaxWidthWzgwMF0.png)
4. **Figure 4** - <https://forums.autodesk.com/t5/image/serverpage/image-id/885871i2434BC8785DACC22?v=v2>
5. **Table 1** - Joinery Comparison.
6. **Figure 5**- <https://www.ikea.com/in/en/cat/tables-chairs-fu002/>
7. **Figure-6**  
[https://www.godrejinterio.com/imagestore/B2C/DINCHR117/DINCHR117\\_01\\_803x602.jpg](https://www.godrejinterio.com/imagestore/B2C/DINCHR117/DINCHR117_01_803x602.jpg)
8. **Figure 7** <https://ii1.pepperfry.com/media/catalog/product/b/i/1250x625/bingo-fabric-3-seater-sofa-in-grey-colour-bingo-fabric-3-seater-sofa-in-grey-colour-1uv50v.jpg>
9. **Figure 8** - <https://www.damroindia.com/>
10. **Table 2** - Analysis of Case Studies