

Exploring Dynamic Spatial Flow Patterns in Mixed-Use Developments: A Comprehensive Analysis

IKAH JUSTICE¹, IYEREF A COOKEY-GAM²

^{1,2} Department of Architecture, Rivers State University, Port Harcourt, Nigeria.

Abstract- As our societies continue to change, mixed-use developments are becoming more popular as a solution for modern urban needs. This journal article dives into "Dynamic Spatial Flow Patterns in Mixed-Use Developments," aiming to reshape how we think about movement and interaction in these complex spaces. Understanding the need for flexibility and adaptability, the study focuses on designing pathways that can adjust to how spaces are used over time. But it goes beyond just functionality; it also looks at how aesthetics and user experience play a crucial role in making these developments successful. The article suggests new design principles and strategies to align spatial flow with the overall architectural vision by analyzing case studies, spatial flow, and user behavior. The ultimate aim is to create lively and engaging environments that benefit the communities they serve, imagining mixed-use developments as vibrant spaces full of life and energy.

Indexed Terms- Design Principles, Navigation, Mixed-Use Developments, Spatial Flow Patterns, User Perception.

I. INTRODUCTION

The degree of texture, density, and function combining can be used to characterize mixed-use development. A mixed-use development, according to several developers questioned, entails combining a variety of retail, workplace, residential, hotel, leisure activities, or other uses in a planned and well-coordinated environment. As an alternative, it can be defined as having one or more floors set aside for non-residential uses, such as commercial or retail, and one floor used for residential purposes. In mixed-use developments, however, there is a need for both functional and physical integration of components as well as cohesive planning (Huston 2013).



Figure 1: The Mix of Mix Uses

Source: Research Gate (2020)

(https://www.researchgate.net/publication/366371511_Mixed_Use_Development_Attributes_And_Comparison_With_Single_Use_Developments)

Hybrid or mixed-use refers to the blending of several uses within a physical architectural form to integrate urban life (Salami, Isah, and Muhammad 2021).

Mixed -Use Development is a planned development that comprises more than one use (Khakzand 2019).

From my perspective, a mixed-use development can be defined as “the piecing together of different building types to function simultaneously and effectively in one facility or a specific area (i.e. proposed location/site)”.

There have been periodic changes in the notion of mixed-use areas in urban development throughout history. Pre-industrial communities, where people lived, worked, and shopped all within the same city walls, naturally combined a variety of functions. On the other hand, the garden city model of independent towns was emphasized by the contemporary town planning movement, which supported separated land uses. This school of thought acknowledged the externalities of industrial production while striving to establish secure residential neighborhoods.

Segregated land uses, including the division of residential, commercial, and office zones and government support for industrial parks, were prevalent in the mid-20th century. Mixed-use areas have become more prevalent as a result of calls for environmental conservation and heritage preservation. After the segregated land use paradigm was criticized by urbanist Jane Jacobs, planners started to embrace mixed-use as a way to save energy costs and improve urban livability (Grant 2007).

Mixed-use developments are usually classified using different criteria but the density/style of the building is the most popular way of classifying mixed-use buildings (Wardner 2014). They are:

1. Vertical Mixed-Use Developments: There are numerous applications combined into one vertical mixed-use property. In the vertical mixed-use development, the functions and purposes of each floor vary. It is possible to add office spaces to either the ground floor or the first floor, as well as place stores and restaurants on the bottom floor. The upper floors are often used in residential areas.

A common feature of a vertical mixed-use complex is a public area. All the building's residents can congregate here to work together or form connections. a strategy to improve social engagement. Some of them concentrate on creating a connection between the private areas on the upper stories and those spaces on the lower floors.

This kind of placement revitalizes the neighborhood and promotes further growth of some public areas. It is mostly found in areas with insufficient land.

2. Horizontal Mixed-Use Developments: A horizontal mixed-use development is one in which every building has a different assigned use. more frequently one use, but inside a complex. It may occasionally consist of a development with buildings that are all designated for a particular use. A residential building, a retail structure, an office building, and an entertainment or leisure building are all possible additions to this complex. Within the complex, there may also be parks, green areas, and sports facilities. This kind of mixed-use construction will have both public and private areas, some of which are accessible to everyone.

Generally speaking, this is the best option for towns or cities with extra land. Those who can design excellent, functional public areas surrounding the structure are also desirable.

II. SPATIAL FLOW & USER-CENTERED DESIGN

The theory of spatial flow encompasses a range of analytical, quantitative, and descriptive instruments for examining the spatial configurations seen in various structures, interior areas, and outdoor environments. Spatial flow is primarily concerned with the relationship between people and the places they live in. It is thought that cultures have unique qualities that are contained inside spatial systems and that knowledge is communicated through both space and the way that places are organized (Dursun 2007). Developing description mechanisms for arranging inhabited areas such that the underlying social meaning can be expressed is the goal of spatial flow research.

The design methodology known as "user-centered design" centers the design process around the requirements and preferences of the end user. This has gained popularity in the realm of architecture recently as more architects realize how important it is to design structures that are not just aesthetically beautiful but also practical and easy for people to utilize (Xavier 2022).

The goal of user-centered design is to meet the demands and capacities of users by enabling them to highly function. This includes considering the physical and psychological needs of human users, as well as all components of their physical environment (El Sayad et al., 2017).

Traditionally, the goal of architectural design has been to create aesthetically pleasing structures that express the style and vision of the designer, frequently at the price of usability and functionality. But to develop structures that satisfy the requirements and tastes of their users, architects have come to understand how crucial it is to apply user-centered design concepts in recent years. Through research, users' wants and preferences are understood, and a

facility/building or environment is then designed to satisfy those demands (Xavier 2022).

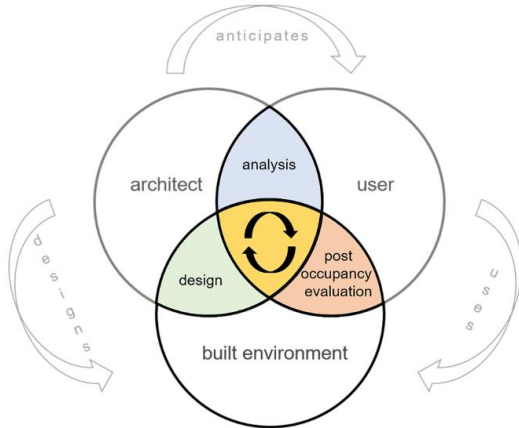


Figure 2: User-Centric Design Approach

Source: Research Gate, 2021 ((PDF) User-Centred Spatial Thinking in Architectural Design with Mixed Reality (researchgate.net))

Inclusivity is emphasized by user-centered design concepts, which take into account the diverse demographics, skill levels, and cultural backgrounds of users. Mixed-use developments have spaces that are tailored to meet the demands of a wide range of users, irrespective of their age, level of mobility, or other attributes. By implementing this strategy, venues become more functional and the community is encouraged to feel equitable and inclusive (Sayad and Farghaly 2020).

When creating easily navigable places in mixed-use complexes, several factors that affect flow and mobility must be carefully taken into account. The following are some essential ideas and tactics:

- i. **Clear Circulation Pathways:** It's critical to have circulation channels that are both intuitive and clear. Create clear, distinct, and easy-to-follow pathways that help users navigate the development.
- ii. **Zoning and Spatial Hierarchy:** Within the mixed-use development, identify spatial zones according to their uses and functions. Divide or arrange areas based on their intended use, making sure that related spaces or activities are grouped. For example, to improve customer experience and streamline navigation, arrange shop spaces,

dining areas, or recreational facilities in designated zones.

- iii. **Wayfinding Components:** Place digital displays, maps, or signage in key locations at decision-making points throughout the development to create efficient wayfinding components. Users can more easily orient themselves, locate certain locations, and move through the complex with the use of clear and informative signage.
- iv. **Landmarks & Aesthetic Continuity:** Integrate eye-catching landmarks or focal points at key places throughout the development while upholding an aesthetic continuity. By acting as landmarks, landmarks help people get their bearings and find their way about an area more quickly.
- v. **Flexibility & Adaptability:** When designing spaces, keep in mind that they will need to adapt to changing needs and usage patterns. Make sure that areas and paths are flexible enough to accommodate upcoming changes or additions without affecting the general connection and flow.
- vi. **Technological Integration:** To improve user experience and offer real-time navigation support, integrate digital technologies like augmented reality interfaces, interactive kiosks, and mobile apps into mixed-use development.

III. APPLICATION OF USER-CENTERED DESIGN APPROACH

The user-centric theory regarding the built environment gauges its efficacy based on the support it offers to human activities. It assumes that insufficient support indicates an unfavorable situation. However, various factors influence user experiences and space utilization, encompassing memories, emotions, and beliefs. Individual, group, and organizational users are subject to external influences impacting their relationship with the building. A space supporting one group might not suit another due to different tools, resources, or user characteristics like age, gender, or language (Vischer 2008).

In such scenarios, it may be more rational to assess the user experience in built space as falling on the negative side of quality or comfort rather than deeming the environment a failure. This understanding may offer a basis for positive interventions to improve the situation, enhancing our comprehension of the environment-behavior relationship.

Historically, built environments have aimed to accommodate specific human activities, from ancient caves to modern-day constructions. The disconnect between contemporary built environment systems and user experiences is puzzling. The construction industry, often characterized by reluctance to change, outdated practices, and a focus on cost over quality, appears detached from prioritizing user needs.

Expanding the user-centric theory's applicability across various building types could enhance environmental support for human activities. Integrating user experiences and feedback into the construction process may eventually alter industry practices, influencing buildings' economic value. Continuing to refine this theory designed around user experiences and their interplay with the built environment holds the potential to bridge the gap between theoretical concepts and practical applications (Vischer 2008).

Ultimately, the aim remains to create a positive, supportive built environment that enriches human activities and aids in fulfilling aspirations, rather than accommodating spaces that fail to serve their intended purpose effectively.

IV. RESEARCH METHODOLOGY

Data collection involves systematically gathering and measuring information on relevant variables to address research questions, test hypotheses, and assess outcomes (Muhammad and Kabir 2018).

The research methodology primarily relies on secondary research methods and case studies to provide a thorough analysis. Key mixed-use developments were carefully selected for detailed examination, ensuring a robust and comprehensive study. Secondary data from journal articles and

existing literature formed the foundational context for the analysis, offering extensive insights into user movement patterns. This focus on secondary sources and case studies allows for a nuanced understanding of spatial flow dynamics in mixed-use developments.

V. FINDINGS

Several mixed-use developments, including prominent developments in urban centers, were examined. The findings highlight the importance of adaptable design elements such as modular pathways, flexible public spaces, and clear signage. These features significantly improve user navigation and overall satisfaction. Zoning, the strategic division of different functional areas within a development, emerged as a critical factor in optimizing spatial flow. By clearly delineating residential, commercial, and recreational zones, the circulation within the facility is enhanced, reducing congestion and improving accessibility. For instance, commercial zones are best positioned near main entrances and exits to attract foot traffic, while residential zones benefit from quieter, more private locations within the development.

Younger users prioritize connectivity and social spaces, often gravitating towards communal areas and transit hubs. In contrast, older demographics place a higher value on accessibility and safety, favoring areas with clear signage and easy navigation. These insights inform zoning strategies that cater to diverse user needs, ensuring that mixed-use developments remain inclusive and adaptable to the changing dynamics of urban life. Effective zoning not only enhances user experience but also promotes efficient movement by directing flows to appropriate areas, thus minimizing conflicts and maximizing the functionality of the space.

CONCLUSION

Dynamic spatial flow is integral to the success of mixed-use developments. By adopting flexible design principles and considering user behavior, architects and urban planners can create environments that are not only functional but also enriching and responsive to the needs of the community. Future developments should continue to explore innovative approaches to

spatial flow, ensuring that mixed-use developments remain adaptable to the evolving urban landscape. The integration of dynamic spatial flow principles into mixed-use developments fosters environments that are both efficient and inspiring, enhancing the quality of life for urban dwellers.

ACKNOWLEDGMENT

We extend our gratitude to Rivers State University for providing resources and support. Special thanks to all collaborators and participants who contributed to this research.

REFERENCES

- [1] Dursun, Pelin. (2007). "Space Syntax in Architectural Design." *The Journal of Chemical Physics* 69(3):1207–12.
- [2] Grant, Jill. (2007). "Encouraging Mixed Use in Practice." *Incentives, Regulations, and Plans: The Role of States and Nation-States in Smart Growth Planning* (January 2007):57–76. doi: 10.4337/9781847204325.00011.
- [3] Huston, Simon. (2013). "Vertical Mixed-Use Communities: A Solution to Urban Sustainability? Review, Audit, and Developer Perspectives." (2005).
- [4] Khakzand, Mehdi. (2019). "Mixed Use Development, A Solution For Improving Vitality Of Urban Space Mixed Use Development, A Solution For Improving Vitality Of Urban Space." (March 2016):134–140.
- [5] Muhammad, Syed, and Sajjad Kabir. (2018). "Methods of Data Collection." (July 2016).
- [6] Salami, Shakirat Folashade, Abubakar Danladi Isah, and Isa Bala Muhammad. (2021). "Critical Indicators of Sustainability for Mixed-Use Buildings in Lagos, Nigeria." *Environmental and Sustainability Indicators* 9(January). doi: 10.1016/j.indic.2021.100101.
- [7] Sayad, Zeyad El, and Tarek Farghaly. (2020). "INTEGRATING HUMAN-CENTERED DESIGN METHODS IN EARLY DESIGN INTEGRATING HUMAN-CENTERED DESIGN METHODS IN EARLY DESIGN STAGE: USING INTERACTIVE ARCHITECTURE AS A." (July 2017). doi: 10.21608/auej.2017.19180.
- [8] El Sayad, Zeyad, Tarek Farghaly, and Sara Hamada. (2017). "INTEGRATING HUMAN-CENTERED DESIGN METHODS IN EARLY DESIGN STAGE: USING INTERACTIVE ARCHITECTURE AS A TOOL." *Journal of Al-Azhar University Engineering Sector* 12(44):947–60. doi: 10.21608/AUEJ.2017.19180.
- [9] Vischer, Jacqueline C. (2008). "Towards a User-Centred Theory of the Built Environment." *Building Research and Information* 36(3):231–40. doi: 10.1080/09613210801936472.
- [10] Wardner, Pamela. (2014). "EXPLAINING MIXED-USE DEVELOPMENTS : A CRITICAL REALIST ' S PERSPECTIVE." 19–22.
- [11] Xavier, Joseph. (2022). "Enhancing Functionality and User Experience through User-Centered Design in Architectural Design." 8. doi 10.37421/2472-0437.2022.8.168.