

INTEGRATING AUTISM-FRIENDLY DESIGN IN MALAYSIAN PUBLIC SPACES

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Abstract. This paper examines the emergence of autism-friendly public spaces in Malaysia through an analysis of visual spatial elements and design principles used in accessible environments. Employing a qualitative approach, this study presents findings on the current state of accessible design for individuals with Autism Spectrum Disorder (ASD) in Malaysian urban contexts through expert interviews. The paper examines best practices, including the case study of Sunway Putra Mall's implementation of autism-friendly concepts, and proposes a framework for future improvements. The study reveals an increasing trend toward adopting disability-sensitive architectural features in Malaysia, with prospects for enhanced autism accommodation specifically in sensory design, staff knowledge, and public understanding. Key themes discussed include awareness and adoption, sensory considerations in construction, staff training, technology integration, and public education. Additionally, the study identifies economic values of autism-friendly design and explores the concept of future-proofing buildings for neurodiversity. Despite challenges such as perceived high costs and lack of standardized protocols, this research concludes that systematic application of design principles, effective staff training, and public education are essential to realizing an autism-friendly Malaysia. This study serves as a reference for subsequent interventions and policies aimed at creating accommodating and acceptable public environments for individuals with ASD and their families.

Keywords: *autism-friendly design, public spaces, visual spatial elements, inclusive design, neurodiversity, Malaysia*

Introduction

Autism Spectrum Disorder (ASD) has become a prevalent condition affecting millions of individuals globally, with increasing prevalence observed in Malaysia. Individuals with ASD have unique sensory and cognitive requirements that must be carefully considered when designing public spaces. Over recent years, Malaysia has experienced significant improvements in creating inclusive urban environments that accommodate diverse populations. The term 'autism-friendly design' refers to design approaches that are appropriate for individuals with autism or that incorporate principles specifically tailored to their needs (Mostafa, 2008). This paper assesses the current provision of autism-friendly design in Malaysia with particular attention to visual spatial elements and design principles. To address gaps in the implementation of inclusive design concepts, researchers collected information from best practices and practitioners in the field while formulating recommendations for advancement. The implications of this study are significant for architects, designers, policymakers, and facility managers seeking effective strategies for creating public spaces that

accommodate individuals with ASD, thereby enhancing their social integration and quality of life. Despite the benefits of autism-friendly environments documented in international contexts, Malaysia has not yet achieved widespread implementation of such spaces. This paper examines the barriers to increased implementation, including cost factors and practical maintenance considerations, while acknowledging the substantial potential positive effects on inclusive education and social awareness. Research has demonstrated that understanding the preferred sensory modalities of children with ASD is crucial for creating effective learning and public environments (Hassan et al., 2024a).

Literature review

Autism-friendly design principles

Autism-friendly design in public spaces has gained increasing global attention, aiming to create environments that accommodate the unique sensory and cognitive needs of individuals with ASD. Key principles include predictability in spatial organization, control of sensory stimuli, provision of calming spaces, clear wayfinding, and flexibility (Mostafa, 2008). Visual spatial considerations play a crucial role, leveraging the visual processing strengths often associated with ASD (Grandin, 2006). Strategies include the use of visual schedules, pictorial signage, consistent color coding, and simplified layouts. Notable implementations have been documented in the United States, United Kingdom, and Australia, serving as models for inclusive design internationally. In Malaysia, awareness and implementation of autism-friendly design remains in early stages compared to some other countries. Research has found that many autism schools in Malaysia do not fully meet the needs of children with ASD in terms of environmental design (Nazri and Ismail, 2015). Studies note a lack of consideration for factors such as color, lighting, and ventilation that can significantly impact learning and behavior for individuals with ASD. This aligns with findings emphasizing the importance of understanding preferred sensory modalities for children with ASD to create effective environments (Hassan et al., 2024b).

Current implementation in Malaysia

Despite challenges, Malaysia has recently begun recognizing the importance of autism-friendly design. Sunway Putra Mall's initiative to become the first autism-friendly shopping mall in Malaysia marks a significant milestone. However, like many countries, Malaysia faces challenges in widespread implementation, including lack of standardized guidelines, limited understanding among stakeholders, perceived high costs, and competing urban development priorities (Ghazali et al., 2018). Research has demonstrated that autism-friendly spaces can have profound effects on academic performance, social integration, and family quality of life (Rapp et al., 2018; Nagib and Williams, 2017; Gaines et al., 2016). Cost considerations often present barriers to implementing autism-friendly design features in Malaysia. Studies report that many autism schools are designed based on budget constraints rather than specialized needs (Nazri and Ismail, 2015). However, researchers argue that many autism-friendly design elements can be incorporated cost-effectively, especially when planned from the outset of construction projects. The long-term benefits of increased usability and community goodwill may outweigh initial investments, making this understanding crucial for encouraging wider adoption of autism-friendly design principles.

Future yechnologies and universal design

Emerging research points to the potential of smart building technologies and virtual reality for creating more inclusive and adaptable spaces for individuals with ASD. Studies highlight how virtual reality and interactive technologies have shown promise in teaching social skills and enhancing communication for people with autism (Hassan et al., 2024a). Additionally, augmented reality has demonstrated benefits in increasing engagement and comprehension for children with ASD. These technological advancements offer promising avenues for creating more inclusive and adaptable spaces. As awareness grows and technology advances, there is increasing demand for flexible spaces that can adapt to diverse needs (Borowczyk, 2019). This aligns with the concept of universal design, which aims to create environments usable by all people to the greatest extent possible. This approach not only benefits individuals with ASD but also contributes to creating more inclusive public spaces for all users, representing an important direction for future development.

Materials and Methods

This study employed a qualitative research design to obtain detailed information on the current and future status of autism-friendly design in Malaysian contexts. The primary data collection technique was expert interviews, which offered comprehensive perspectives on the topic. Participant selection criteria ensured diversity in expertise, with five experts chosen from relevant fields: an autism education specialist, an architect specializing in inclusive design, an occupational therapist working with ASD individuals, a facility manager of an autism-friendly space, and a parent advocate for autism inclusion. Semi-structured interviews were conducted with each expert, lasting approximately 60 minutes. This format provided flexibility in responses while maintaining consistency across interviews. Questions addressed the current state of autism-friendly design in Malaysia, effective visual spatial elements, implementation challenges, technology roles, staff training importance, observed impacts, awareness strategies, future recommendations, cost considerations, long-term economic benefits, and future building considerations for neurodiversity. Thematic analysis was applied to analyze the interview data, involving coding transcripts, categorizing codes, and identifying overarching themes. Two authors independently coded the transcripts and compared results to increase reliability. Member checking was employed by returning findings to interviewed experts for review and verification. While this methodology provided rich qualitative data, limitations include the small sample size and urban-focused participant pool, suggesting that future research would benefit from more diverse participants including rural perspectives (*Table 1*).

Table 1. Interview questions for expert participants.

No.	Interview question
1	How would you assess the current state of autism-friendly design in Malaysian public spaces?
2	What specific visual spatial elements have you found to be most effective in creating autism-friendly environments?
3	Can you describe any successful implementations of autism-friendly design you have encountered in Malaysia?
4	What challenges do you see in implementing autism-friendly design principles in Malaysia?
5	What role do you think technology can play in enhancing autism-friendly spaces?
6	How important is staff training in maintaining an autism-friendly environment?
7	How do cost considerations impact the implementation of autism-friendly design in Malaysia?
8	How can future building designs better incorporate neurodiversity considerations?

Results and Discussion

The analysis of expert interviews revealed several key themes regarding autism-friendly design in Malaysia. These themes encompass growing awareness and implementation, sensory considerations in design, importance of staff training, technology integration, public education and awareness, cost-benefit considerations, and future-proofing buildings for neurodiversity. Each theme represents a critical aspect of developing comprehensive autism-friendly environments in the Malaysian context (*Table 2*). The proposed framework illustrates the essential attributes for creating inclusive Malaysian environments for individuals with autism (*Figure 1*). At the center is the core concept of 'Autism-Friendly Spaces in Malaysia,' surrounded by seven key themes: growing awareness and implementation, sensory considerations in design, staff training, technology integration, public education, cost-benefit analysis, and future-proofing for neurodiversity. The secondary ring incorporates Visual Spatial Elements, Design Principles, Inclusive Education, Cost Considerations, and Building Technologies. Bidirectional arrows indicate the integration between themes, while dotted lines represent the contextual relationships between multiple aspects of autism-friendly design.

Table 2. Summary of expert responses by theme.

Theme	Key findings
Growing Awareness and Implementation	Sunway Putra Mall's initiative recognized as significant milestone; increasing number of calm rooms and sensory-friendly areas in public spaces
Sensory Considerations in Design	Effective use of lighting controls in newer buildings; implementation of quiet zones in several shopping centers
Importance of Staff Training	Some organizations providing autism awareness training to frontline staff; positive experiences reported by families in trained environments
Technology Integration	Use of visual scheduling apps in educational settings; interactive wayfinding systems being piloted in select locations
Public Education and Awareness	Increasing media coverage of autism-friendly initiatives; growing number of autism awareness events in urban areas
Cost-Benefit Analysis	Initial costs often offset by long-term benefits; increased customer loyalty and community goodwill reported by businesses
Future-Proofing for Neurodiversity	Growing interest in flexible, adaptable spaces; emerging technologies offering cost-effective solutions for personalized environments

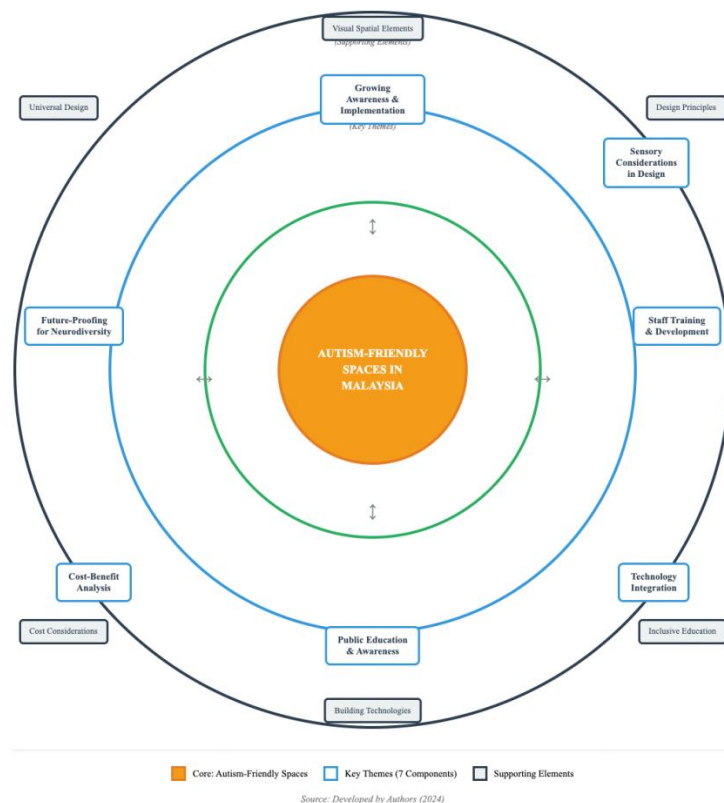


Figure 1. Proposed framework for autism-friendly design in Malaysian public spaces.

The findings indicate a positive trajectory toward the development of autism-friendly spaces within Malaysia, exemplified by initiatives such as Sunway Putra Mall. All interviewed experts identified key themes including professional recommendations, need for awareness, impact on facility design, and recognition of ASD needs, particularly relevant for urban practitioners. The installation of calm rooms and sensory-friendly spaces within public spaces aligns with established principles documented in the literature (Mostafa, 2008). However, experts noted that these concepts are not yet consistently applied across various public areas. The critical importance of staff training was emphasized by all experts, consistent with international literature (Nagib and Williams, 2017). This finding is supported by accounts from parents of children with ASD who reported positive experiences in environments where staff had undertaken autism awareness training. Technology utilization emerged as a high-need enabler for creating more autism-friendly environments. The use of visual scheduling apps and interactive wayfinding systems aligns with the visual processing strengths typically present in individuals with ASD (Tola et al., 2021; Grandin, 2006). However, Malaysian experts noted that technology implementation remains nascent and would benefit from further advancement.

Public awareness and knowledge regarding autism emerged as fundamental to developing subsequent autism-friendly measures. While there is an upward trajectory in media coverage and autism awareness programs, particularly in urban centers, professionals advised that such efforts should increase and remain consistent across society. An unexpected finding concerned perceived high costs of autism-friendly interventions. Expert consultation revealed that many beneficial design features can be implemented inexpensively, particularly when incorporated early in project planning.

The long-term economic benefits, including increased customer loyalty, typically outweigh initial investment costs. A significant discussion point concerned the lack of planning for neurodiversity in future constructions. With advancing technology and growing awareness, greater emphasis has been placed on creating flexible spaces with adaptive capabilities. This principle aligns well with universal design concepts, where environments are arranged to be accessible to all without modification. Experts emphasized the transformative potential of autism-friendly teaching environments for inclusive education, noting that schools adopting these design principles have reported increased academic achievement, social inclusion, and reduced stress among students with ASD.

Conclusion

This study reveals the current state of autism-friendly design in Malaysia, highlighting both achievements and areas requiring improvement. Effective initiatives such as Sunway Putra Mall's autism-friendly shopping day demonstrate the potential for developing more accessible public spaces. However, greater emphasis must be placed on consistent application of design principles, adequate staff training, and increased public awareness for autism-friendly design in Malaysia to reach its full potential. This study has certain limitations, including a small number of expert respondents and focus on urban samples. Future research would benefit from larger, more diverse participant pools, including rural perspectives. Additionally, quantitative research examining how autism-friendly environments specifically affect individuals with ASD and their caregivers would provide valuable complementary data to these qualitative findings.

The findings of this study are particularly relevant as Malaysia progresses toward developing frameworks for inclusive design. Identifying patterns and gaps for specific populations such as individuals with ASD and their families can inform future campaigns and policies, leading to a more inclusive society and environment. For more efficient and healthy spaces in the future, the utilization of smart building technologies and application of virtual reality in design stages appear promising. Advancements in technology and emerging acceptance of neurodiversity indicate an era in which buildings may naturally accommodate different cognitive and sensory needs. While challenges remain in reducing implementation costs and ensuring policy compliance, the undeniable advantages of autism-friendly design, including improved educational outcomes and enhanced community participation, provide compelling justification for continued investment and development. This research contributes to the growing body of knowledge on inclusive design while providing practical guidance for creating environments that support the wellbeing of individuals with ASD and their families in Malaysia.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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