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Stadium as An Inclusive Public Space for Resilient Community

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ABSTRACT

This paper analyses sports stadiums' ongoing transformation and surrounding areas in Asian urban landscapes, specifically focusing on notable examples like KL Sports City and Kai Tak. The role of these stadiums is shifting from traditional sports venues to multifaceted urban elements that align with the evolving needs of contemporary urban development, driven by changing demographics, notably ageing populations, and increasing demands for inclusivity, equity, and accessibility in public spaces. As a result, sports complexes are now being designed as vibrant community hubs that extend beyond hosting major sports events, incorporating retail and community zones, educational facilities, and medical services, contributing to the creation of sustainable neighbourhoods and resilient urban communities. This transformation is grounded in universal design principles, ensuring accessibility and inclusivity for diverse users. The study examines how thoughtful public area design engages the broader population in active lifestyles, investigating strategies to promote inclusivity and accessibility. By analyzing best practices and the shifts in public and sports areas within these facilities, this research offers valuable insights into the changing nature of sports stadiums, proposing innovative approaches to design and management that highlight their potential to enhance urban life beyond their traditional function, ultimately presenting a forward-looking perspective on the integration of sports stadiums into the urban fabric.

1. Introduction

The transformation of large sports venues into multifaceted urban hubs has reshaped the architectural and operational paradigms in stadium and arena planning and had a profound global impact on urban development, embracing several dimensions such as physical, economic, social and environmental, as per Roberts, *et al.*, [1]. The initial shift, driven by the burgeoning Olympic movement and revolutionary advancements in global broadcasting technologies, opened substantial commercial opportunities for sports federations worldwide, as per Chapin, *et al.*, [2]. This global audience engagement broadened the exposure of international competitions like the Olympics and World Cup

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and intensified demands from sports federations for more sophisticated infrastructure. These entities, representing the most popular sports, required enhanced venue features, including modernised stadium layouts, comprehensive training facilities, and expansive hospitality zones, as per Chapin, *et al.*, [2], to accommodate a diverse and demanding global audience.

The prestige associated with hosting such high-profile international events elevated their status to symbols of national pride and achievement, compelling host countries to comply rigorously with the stringent standards set by international sports federations. This compliance led governments to channel substantial public funds into developing Olympic parks and state-of-the-art stadiums. These investments were expected to yield significant returns in tourist revenue and urban infrastructure enhancements. However, the strategic focus was often short-term, emphasising immediate event success over long-term venue sustainability. This oversight frequently resulted in what is commonly referred to as the "white elephant" phenomenon, where stadiums, once the centrepiece of global sporting events, languished underused or abandoned due to the prohibitive costs of maintenance and operations post-event. Factors contributing to this outcome included poor legacy planning, inappropriate site selections, and a lack of integration of these venues into the daily lives of the local community, which undermined their commercial potential and public utility, as stated by Zimbalist and Agha, *et al.*, [3].

Adding to the complexity of sports venue management, the increasing popularity of stadium shows and concerts introduced a new dynamic to stadium utilisation. Unlike traditional sports events, these entertainment spectacles required venues to accommodate large-scale performances, significantly altering the stadium calendar dynamics. Major concerts and shows started to take precedence, occupying prime weekend slots, while traditional sports events were relegated to weekdays. This shift necessitated extensive modifications to stadiums and arenas' programmatic scheduling and physical layout. New architectural adaptations included the development of specialised concert zones equipped with enhanced amenities such as performer-specific areas, efficient loading bays for stage equipment, and sophisticated light and sound systems tailored to create optimal viewing experiences for diverse audiences.

Furthermore, the design and operational strategies prioritised the spectator experience holistically, leading to architectural segregation within venues to cater to different spectators—from general admission to premium luxury boxes. This stratification aimed to provide tailored experiences ranging from essential viewing to high-end luxury services, ensuring that all audience segments were catered to with appropriate amenities and services. This approach enhanced the appeal of stadiums as entertainment venues and improved their commercial viability by diversifying revenue streams beyond traditional sports events. Another profound impact on the design and planning of sports venues has stemmed from the growing prominence of Paralympic sports and the broader social shifts related to demographics and public health.

The increasing recognition of Paralympic sports brought to the forefront the need for venues to be universally accessible, as described by Sholanke and Eleagu, *et al.*, [4], accommodating athletes and spectators with varying physical abilities. This inclusivity extends beyond compliance with accessibility standards to embrace a design philosophy that fosters full participation and equality. Additionally, changing population demographics, such as ageing communities, the economic impacts associated with obesity and chronic illnesses, and the isolating effects of digital technologies and metaverses, have underscored the need for sports venues to serve as community-centric spaces promoting physical activity and social interaction.

In response to these evolving needs, contemporary sports venue design should integrate features that support a wide range of activities and user groups, ensuring that these spaces contribute effectively to the resilience and vitality of urban communities, as described by Humphreys, *et al.*, [5]. By fostering inclusive and adaptable environments, sports venues must be repositioned not just as sites of spectatorship and consumerism but as integral components of healthy, dynamic urban ecosystems.

However, a notable gap persists between societal demands for multifunctional sports venues and the capabilities of architectural firms to design such facilities effectively. This disparity is primarily due to a need for global experience in creating venues that seamlessly integrate social, commercial, training, and competition needs without compromising functionality and inclusivity. Moreover, there is a shortage of comprehensive studies and observations by architects specialising in sports facilities, further exacerbating this gap. This study addresses these challenges by aiming to systematically collect and analyse data from previously developed projects that have incorporated various types of social and inclusive integration. It evaluates the general approach for integrating these projects into urban contexts, critically assessing successes and shortcomings. The goal is to synthesise insights from these case studies to formulate robust guidelines and recommendations. These will develop new sports venues and redevelop existing stadiums and sports clusters in Asia.

2. Methodology

2.1 Primary Observations And Benchmarking

The research methodology employed in this study integrates a multifaceted approach to understanding the transformation of sports venues, particularly within the Asian region, emphasising their evolving role in urban development. The methods comprise five distinct types of actions:

- i. Theoretical Preparation: This involves thoroughly reviewing relevant articles and publications to establish a robust theoretical framework, ensuring the research is grounded in well-established concepts and prior studies related to sports venue development.
- ii. Statistical Data Collection: This step includes aggregating statistical data from central Asian countries and analysing demographic and social changes from the early 2000s, with projections extending to 2050. This data provides a basis for understanding regional trends and their impact on sports facility usage and requirements.
- iii. Masterplan and Project Analysis: Comparing global projects involving stadiums and arenas to identify best practices and lessons learned helps understand different architectural responses to similar challenges across diverse contexts.
- iv. Venue Shortlisting: This involves selecting two significant venues that have profoundly impacted their respective cities and neighbourhoods—one that has undergone recent redevelopment and another that represents a new development. These case studies are explored in depth to assess the effects of architectural and strategic choices on local communities and urban integration.

The research methodology also included an architectural analysis of each venue's program, assessing the implemented interaction with the community and the city and evaluating the inclusivity and accessibility of all venue areas for visitors with diverse abilities.

A qualitative research approach was adopted to examine the integration of multifunctional zones within sports stadiums and their territories. This method detailed the criteria for selecting KL Sports City and Kai Tak Sports Precinct as case studies, highlighting their relevance and contribution to the overarching research objectives.

2.2 Project Selection

The selection of projects for in-depth analysis was conducted through comprehensive reviews of the programs, layouts, and master plans of major stadiums and arenas globally, with a particular emphasis on the Asian region. The criteria established for project selection were as follows:

- i. Designed for Major International Events: Each project selected must have been specifically designed to host major international sporting events, ensuring the facilities meet global standards for such competitions.
- ii. Recent Construction: Projects considered were those that have been recently constructed,

extensively rebuilt, or are in the final stages of construction. This criterion ensures the analysis includes modern architectural practices and the latest innovations in stadium design.

- iii. **Diverse Non-Event Day Programs:** Selected venues should offer a comprehensive range of non-event-day activities beyond traditional amenities like food & beverage services and training zones. This includes community engagement activities, cultural events, and public spaces. Including these elements is crucial as they contribute to the venue's day-to-day vibrancy and underline the importance of community in stadium and arena design.
- iv. **Social-Oriented and Inclusive Design:** The projects must firmly commit to social-oriented and inclusive design. This involves integrating features that enhance accessibility and usability for diverse populations, including those with disabilities.

The selection process identified two exemplary projects:

- i. **KL Sports City, Kuala Lumpur:** This venue was chosen for its remarkable redevelopment, transforming existing facilities and the surrounding area, as introduced by Barghchi, *et al.*, [6]. KL Sports City has been integrated effectively into its precinct's urban fabric and daily life, making it a standout example of how sports venues can significantly impact their communities.
- ii. **Kai Tak Sports Precinct, Hong Kong:** CSTB, *et al.*, [7] state this project exemplifies community resilience and inclusivity. As a newly developed extensive sports and community hub, it offers unrestricted access to all venue zones. It is anticipated to have a substantial positive impact on urban life.

These projects were chosen not only for their architectural excellence but also for their demonstrated ability to enhance community interaction and urban integration. The analysis focuses on how these venues serve as models for future stadium and arena design developments.

3. Results

3.1 Statistical Data For The Asian Region

The comparative analysis of demographic statistics from the years 2000 and 2022 and the projected data for 2050 reveals a significant future age distribution gap among the populations of various countries in the SEA region, as detailed in Table 1. This shifting demographic landscape has profoundly influenced the developmental strategies for critical projects such as KL Sports City and Kai Tak Sports Precinct.

Understanding these demographic trends is crucial for tailoring these sports complexes' design and functionality to meet their respective populations' evolving needs. The data highlights the ageing population and varying demographic dynamics across the region, necessitating a flexible and forward-thinking approach in these projects' planning and development phases.

The insights gained from this demographic analysis have guided the integration of age-appropriate facilities and services within these precincts, ensuring they are accessible and engaging for all age groups. Such strategic planning supports the creation of inclusive and dynamic community spaces that cater to a diverse user base, enhancing the venues' utility and relevance in the long term. This demographic-driven approach aims to foster a strong connection between the community and these sports venues, enhancing community resilience and ensuring that these developments remain vital components of their urban landscapes well into the future.

Table 1

The country's population is divided by age groups, which comprise a percentage of the overall population.

Country	The year 2000	Year 2022	The year 2050
Malaysia ¹			
Age group 0-14 years	33,5%	29,6%	16,4%
Age group 15-64	62,3%	65,4%	66,3%
Over 65	4,2%	5%	17,3%
Hong Kong ²			
Age group 0-14 years	17,1%	11,6%	7,9%
Age group 15-64	71,1%	74,8%	52,8%
Over 65	11,2%	13,5%	39,3%
Singapore ³			
Age group 0-14 years	19%	13,8%	9,5%
Age group 15-64	73,7%	77%	58,5%
Over 65	7,3%	9,2%	31,8%
Indonesia ⁴			
Age group 0-14 years	30,6%	27,3%	19,4%
Age group 15-64	65,9%	66,5%	65,6%
Over 65	3,5%	6,1%	15%
Japan ⁵			
Age group 0-14 years	14,7%	13,3%	11,1%
Age group 15-64	67,6%	64%	48,7%
Over 65	17,7%	22,9%	37,6%
Philippines ⁶			
Age group 0-14 years	37,6%	34,6%	27,1%
Age group 15-64	58,1%	61,1%	62,3%
Over 65	4,3%	4,3%	10,6%

Source:

1- Department of Statistics Malaysia

2 - Census and Statistics Department of the Hong Kong Special Administrative Region

3 - Department of Statistics Singapore

4 - Badan Pusat Statistik (BPS)

5 - Statistics Bureau of Japan

6 - Philippine Statistics Authority (PSA)

The redevelopment of KL Sports City focused extensively on cultivating areas specifically designed to captivate and engage the younger generation. This revitalisation introduced various welcoming outdoor spaces, including diverse sports playgrounds and zones dedicated to youth entertainment. In contrast, the design of Kai Tak Sports Precinct has been strategically oriented to cater to the interests of middle-aged and senior populations. This focus is reflected in creating facilities and programs that appeal to these age groups, promoting active lifestyles and social interaction within these communities. The distinct demographic targeting of these projects exemplifies a tailored approach to

community engagement, ensuring that both precincts serve as vibrant, age-appropriate hubs for their respective audiences.

3.2 KL Sports City Analysis Findings

3.2.1 General Project Data.

The original KL Sports City was inaugurated during the 1998 Commonwealth Games, per Barghchi, *et al.*, [6]. The project's brief aimed to transform the site into a hub with four 'new' world-class venues capable of hosting significant events, such as the SEA Games, while providing recreational facilities for the Malaysian community throughout the year. The development team focused on creating a cohesive and livable sports city by modernising and connecting the existing facilities. Enhancements included the addition of more public parklands, natural shading, a 1.4-kilometre synthetic rubber running track, bike paths, and a shaded canopy that spans the boulevard leading to the light rail station, as briefed by Populous, *et al.*, [8].

The initiative was primarily driven by the 29th Southeast Asian (SEA) Games and the 9th ASEAN Para Games, marking a pivotal moment to reestablish Malaysia on the global sports scene. The precinct comprises several essential venues and zones (as stated by MRCB, *et al.*, [9] and illustrated in Figure 1):

- i. A Main Stadium (Bukit Jalil National Stadium, seating capacity after redevelopment - 87,411), with a membrane structure used for the roof, natural turf, and Olympic Track&Field facility – the largest stadium in the SEA region and the ninth largest in the world, as per WorldAtlas, *et al.*, [10]. Capable of hosting major sports events, including International football and rugby events on the 105 m x 68 m natural pitch, International Athletics competitions on the 400m Athletic track with track and field facilities and training lanes, and cultural and community events.
- ii. Axiata Arena is the largest indoor arena in Malaysia, with a seating capacity of 16,000 for sports events and 11,000 for concerts. It can accommodate different sports formats, such as boxing, badminton, basketball, volleyball, table tennis, judo, handball, wrestling, and gymnastics.
- iii. Malaysia National Hockey Stadium (multifunctional stadium with a seating capacity 12,000). It is primarily used for male and female Field Hockey. An adjacent 2,000-capacity training stadium holds a smaller capacity and practice matches, per MHC, *et al.*, [11].
- iv. The National Aquatic Centre (with a seating capacity of 4,000) is the leading outdoor shaded aquatic centre with a 50 m Olympic swimming pool and diving facilities. It meets the International Swimming Federation (FINA) standards for international swimming and diving sports competition events, as per RSPKL, *et al.*, [12].
- v. The National Squash Centre.
- vi. Bukit Komanwel (Commonwealth Hill)
- vii. Family Park
- viii. Bukit Jalil Golf and Country Club
- ix. National Sports Council of Malaysia
- x. Bukit Jalil Sports School – the first particular dedicated sports school in Malaysia, with a focus on the following sports: Diving, Football, Badminton, Tennis, Gymnastics, Cycling, Swimming, track, Weightlifting,
- xi. Bukit Jalil LRT Station – located in the heart of the KL Sports City- provides all visitors seamless access to the sports venues.
- xii. Vista Komanwel (formerly used as 1998 Commonwealth Games village)
- xiii. Vista Komanwel Shopping Centre



Fig. 1. KL Sports City Precinct and nearby development

3.2.2 Masterplan

The KL Sports City Master Plan articulates an ambitious vision for the Bukit Jalil National Stadium redevelopment, as per MRCB, *et al.*, [9]. It aims to ensure its success for the 2017 SEA Games while laying a sustainable foundation for the growth of Malaysia's culture, youth, and sports sectors well into the future, as per Aminuddin and Parilah, *et al.*, [13]. This development was structured over several phases to allow for gradual, sustainable growth and to foster community engagement.

The Master Plan acknowledges and celebrates the site's historical significance, hosting the 1998 Commonwealth Games. It aimed to revitalise existing buildings and spaces, infusing them with new life and upgrading facilities to meet world-class standards. A central theme of the Master Plan was creating a sustainable sporting community designed to function daily, independent of large-scale events, providing activities suitable for all skill levels.

An essential component of the Master Plan focuses on enhancing accessibility and pedestrian-friendliness, as per Fitri, *et al.*, [14]. While it includes adding many parking spaces beneath plazas and strategically positioned multi-storey car parks (Figure 2), the overarching goal is prioritising pedestrian movements and promoting public transportation options (Figure 3). This includes improving connectivity to the nearby Light Rail Transit (LRT) and integrating a new bus station, thus encouraging the public to opt for more sustainable transport alternatives. This approach supports the project's environmental goals and aims to cultivate a more connected and accessible community space for all visitors.

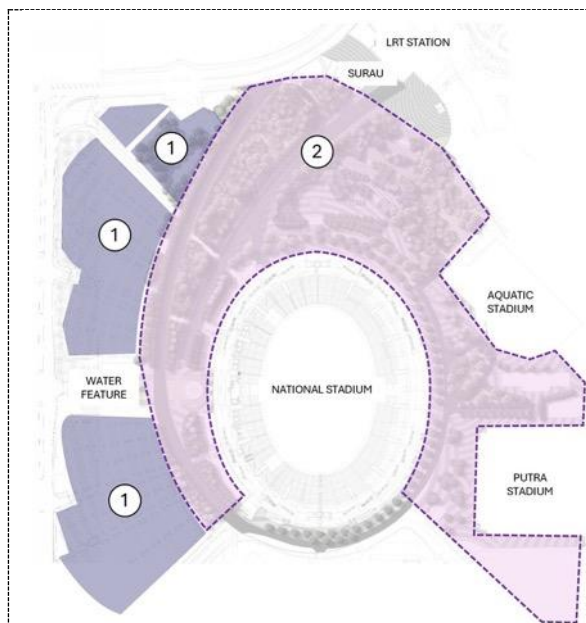


Fig. 2. Car parking zones. (1) Outdoor car parking, (2) Underground and multi-storey car parking

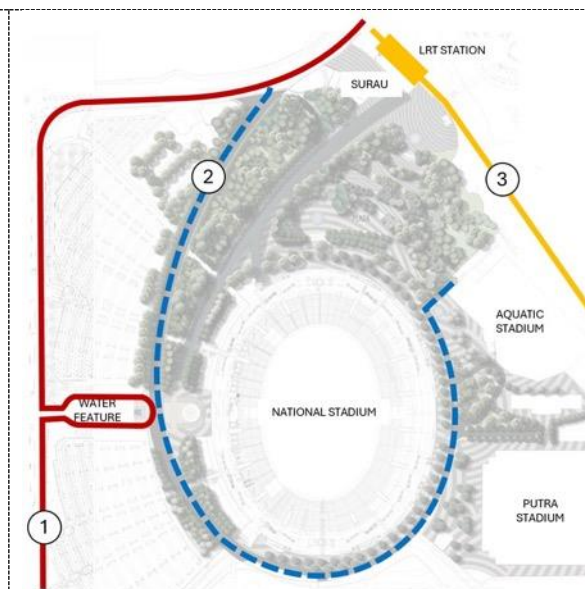


Fig. 3. Site access. (1) Major vehicular movement, (2) restricted vehicular movement, (3) LRT Line and station

3.2.3 Public Ceremonial Boulevard

The boulevard (referenced in Figure 4) serves as the central axis of the development, functioning as the critical spine from which all elements of the project radiate. It is meticulously designed to promote pedestrian movement, extending the influence of KL Sports City through its serpentine-like configuration. This strategic design allows the boulevard to stretch into the northeastern part of the site and future development zones, enhancing the accessibility and reach of the KL Sports City, thereby fostering increased community engagement.

The boulevard is a dynamic blend of roadways, a synthetic running track, landscaped areas, and shaded resting spots. Facilities are accessible from both sides of the boulevard, ensuring that KL Sports City remains vibrant and active daily. This design not only facilitates easy access to various sports and recreational facilities but also encourages regular use by the community, contributing to the vitality and sustainability of the area.

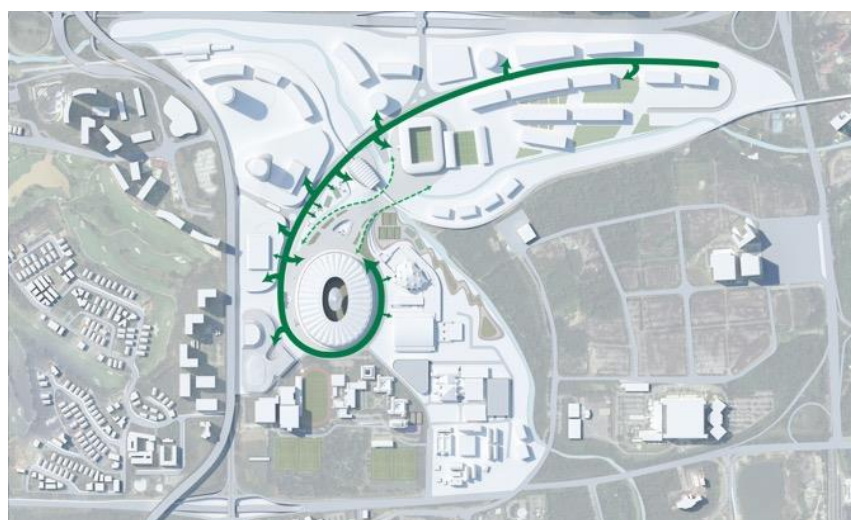


Fig. 4. Public Ceremonial Boulevard

3.2.4 Plaza

The Plaza serves as the central hub of the development, designed to be a fluid and free-flowing conduit that seamlessly connects the National Stadium and the Hockey Stadium (Figure 5). This crucial space is strategically accessible via the Boulevard, nearby Light Rail Transit (LRT) stops, the newly constructed bus station, and underground car parking facilities. This connectivity ensures that the Plaza is a dynamic and accessible focal point for visitors and community members alike.

Operational 24/7, the Plaza is equipped with various facilities that are open to the public. It houses two multi-use sports courts, a selection of cafes, and abundant landscaped seating areas, providing active engagement and relaxation opportunities. The design of the Plaza also incorporates the Youth Centre. This innovative feature cascades to additional recreational facilities, including the Futsal Courts and a running track along the river level.

Integrating these diverse elements makes the Plaza a sports and recreational heart and a social gathering space that enhances community interaction and engagement. Its design encourages continuous activity, fostering a lively environment that attracts diverse users at all hours. This approach ensures that the Plaza remains a bustling, vibrant area that contributes significantly to the vitality and appeal of the development.

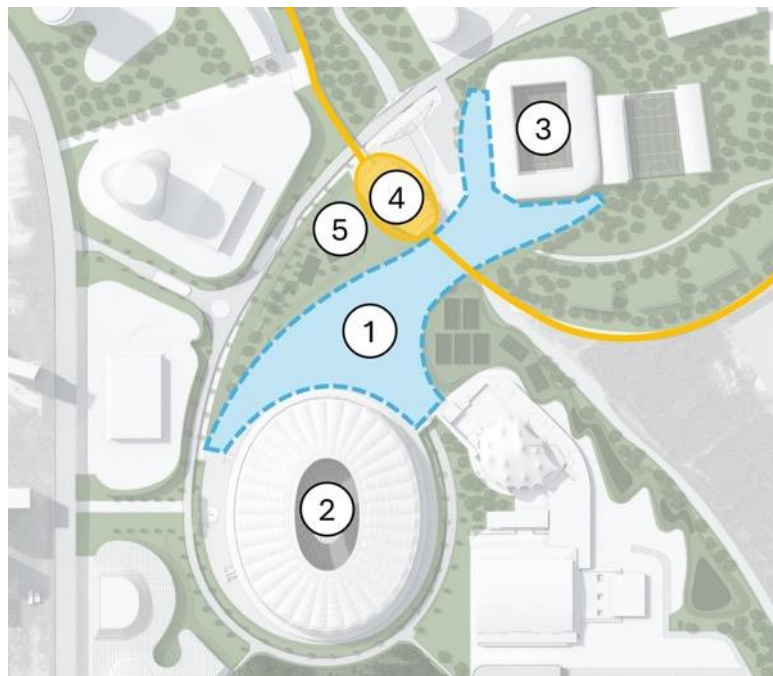


Fig. 5. Plaza. (1) Central Plaza, (2) National Stadium, (3) Hockey Stadium, (4) LRT Station, (5) Bus Stop

3.3 Kai Tak Sports Precinct Analysis Findings

3.3.1 General Project Data.

As stated by CSTB, *et al.*, [7], the site is strategically positioned on the northern apron of the former Hong Kong airport, spanning an impressive area of approximately 28 hectares. The precinct's design centres on the distinctive and striking Kai Tak Sports Avenue. This pivotal avenue establishes a vital linkage from the core of Kowloon Bay to Victoria Harbor, integrating the community with the facilities and extending connectivity to the wider City of Hong Kong.

The precinct is comprised of several vital venues and zones, detailed as follows (as briefed by Populous, *et al.*, [15] and referenced in Figure 6):

- i. A Main Stadium (seating capacity 50,000) with a retractable roof and flexible turf system.

Capable of hosting major sports events, including international football and rugby matches, as well as cultural and entertainment events such as concerts and large-scale community activities, as per RSP, *et al.*, [16];

- ii. A Public Sports Ground (seating capacity 5,000) suitable for school athletics meets training, and local football and rugby matches. It will be opened to the public on non-event days for jogging and playing football, as per CSTB, *et al.*, [7];
- iii. An Indoor Sports Centre with a central arena (seating capacity of 10,000) and an ancillary sports hall (seating capacity of 500) for hosting sports events and competitions of different natures and standards. The main arena and the ancillary sports hall can provide space equivalent to around 48 badminton courts for community sports activities. The main arena can host other cultural and entertainment events and community activities.
- iv. Retail and dining outlets (GFA: 57,000m²);
- v. Dinning Cove (GFA: 3 000m²);
- vi. Health and Wellness Centre (GFA: 2,500m²);
- vii. Bowling Centre (40 lanes); and
- viii. Public Open Space (>8 hectares) including a central plaza across Shing Kai Road, event village, neighbourhood park, waterfront promenade to provide passive amenities and park features, outdoor ball courts, children's playgrounds, fitness stations, a jogging trail, a cycle track connecting the cycle track network in the Kai Tak Development.

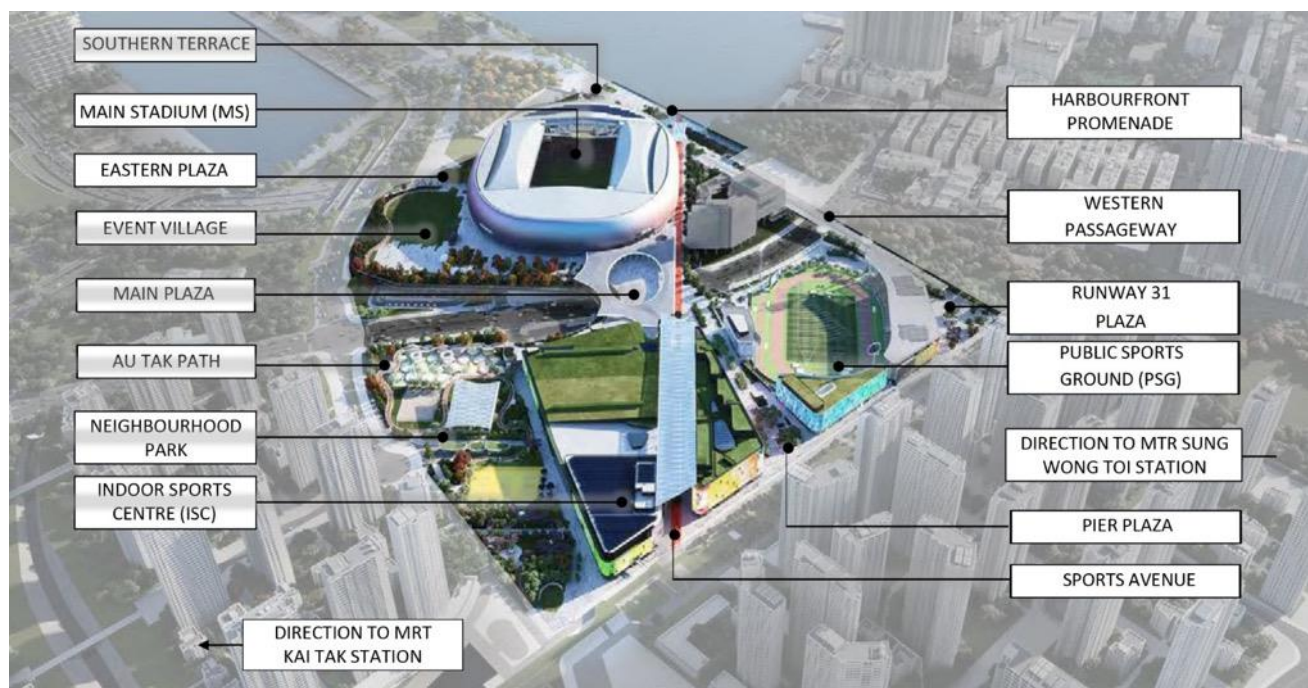


Fig. 6. Sports Precinct and nearby development

3.3.2 Masterplan. Integrated Design

Kowloon Bay has historically been a vital conduit for Hong Kong's connection with the global community. Continuing this legacy, the Kai Tak Sports Park is envisioned as the new heartbeat of the area, transforming it into a vibrant cultural and community hub for the people of Hong Kong. The park melds world-class sports facilities with retail spaces, a wellness centre, and various community leisure areas, making sport and recreation accessible and integral to everyday life for everyone.

As described by Populous, *et al.*, [15], the Kai Tak Sports Park (KTSP) is designed to seamlessly connect to the city from all sides through an extensive network of pedestrian pathways and multimodal transport hubs. This integration facilitates easy access, encourages interaction between the sports park

and the surrounding city, and promotes fluid movement from neighbouring areas into and out of the park (referenced in Figure 7).



Fig. 7. Pedestrian access

KTSP is also a nexus for the community, future athletes, and international sports stars, offering flexible facilities that adhere to international event standards. A vital element of the park's design is the physical and visual connectivity between its facilities and the external parklands. For instance, the transparent walls of the Indoor Sports Centre forge a dynamic link between the internal activities and the external plazas and avenues, creating a lively atmosphere that connects visitors who come to shop, eat, or relax with those actively using the sports facilities.

Furthermore, the design celebrates Hong Kong's rich sporting heritage and aims to inspire future athletes and community members. A Sports Museum and a Walk of Fame are strategically located within the precinct, connected by landscaped walkways, playgrounds, and bike paths, enriching the cultural landscape and fostering a strong community spirit within the sports park (as shown in Figures 8 and 9).



Fig. 8. Community park, and walkways and bike paths



Fig. 9. Integration with the Hinterland. (1) Main walkways, (2) Retail, (3) Community playground

3.3.2 Sports Avenue

The precinct's design is centred around the dynamic and distinctive Kai Tak Sports Avenue (Figure 10), which establishes a pivotal connection from the heart of Kowloon Bay to Victoria Harbour, linking the community, various facilities, and the broader City of Hong Kong. Kai Tak Sports Avenue is a vital pedestrian pathway at Station Square, supported by the nearby Kwa Wan and Kai Tak MTR Stations. It extends to Victoria Harbour.

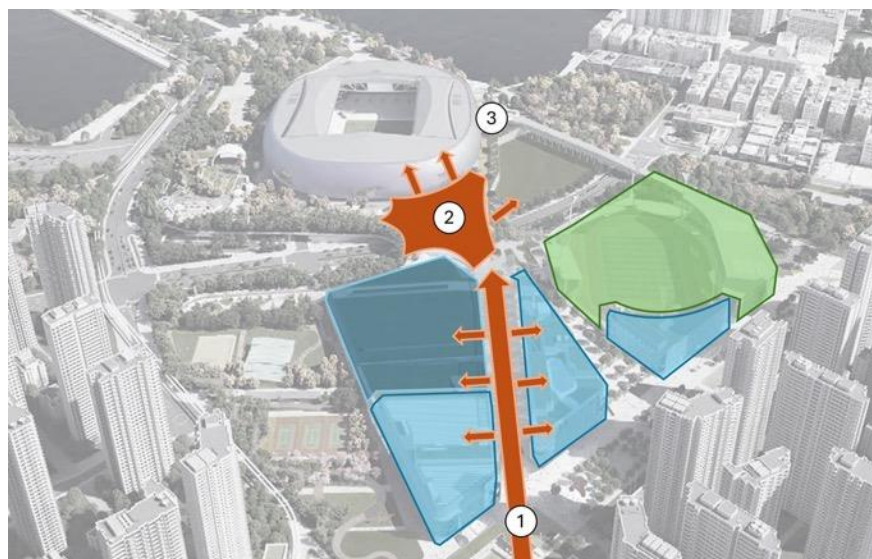


Fig. 7. Kai Tak Sports Avenue. (1) Sports Avenue, (2) Main Plaza, (3) Sports Avenue to Victoria Harbourfront

Kai Tak Sports Avenue offers a unique indoor and outdoor pedestrian experience, guiding visitors through the expansive site. This route connects critical areas, including the indoor sports and retail centre, a public sports ground and wellness centre, the central plaza, and the main stadium, leading up to the Dining Cove. This spot offers stunning views of the harbour, one of the most iconic vistas in the world.

As one traverses along Sports Avenue, the design introduces multiple layers of activity that encourage observation, participation, and inspiration for future engagement. The path through Sports Avenue reveals a lively and ever-evolving precinct enriched with diverse experiences.

At the northern end of the route lies the Kai Tak Sports Mall, a covered arcade that doubles as a retail hub. This mall is interspersed with sport-inspired activities, featuring shops, cafes, table tennis, and an undercover climbing wall. It creates a vibrant recreational and commercial environment that energises the community and enhances the urban experience.

3.3.3 Community Integration

The landscape design of Kai Tak Sports Park masterfully blends passive and active recreation, creating a multifaceted environment where the community can gather and escape the hustle and bustle of city life. It features a variety of tailored areas, from tai chi zones and children's play areas—wet and dry—to sculpture trails and rooftop parklands, making it a vibrant communal hub for the people of Hong Kong.

The Main Plaza is a versatile Event Village, adapting to daily life's rhythmic ebb and flow and special events. During quieter times, it remains a tranquil space for casual visitation. Still, it can transform to host lively festivities that complement stadium events or to accommodate stand-alone markets and festivals, thus becoming a focal point of community engagement.

The Indoor Sports Centre's flexible design accommodates a wide range of activities, from community sports like badminton to international basketball events, e-sports competitions, and concerts for up to 10,000 fans. This adaptability ensures that the centre can meet diverse community needs and attract a broad audience, enhancing its role as a critical component of the sports park's dynamic ecosystem.

4. Conclusions

4.1 Key outcomes

Recent studies have revealed that traditional strategies for injecting commercial value into sports hubs have not delivered the expected benefits to communities. The findings suggest that these methods prioritise economic gain over genuine community engagement and integration. To truly fuse stadium areas into the urban fabric and daily life of the city and its precincts, it is essential to reconsider the foundational elements of planning and design.

The design and development of multifunctional complexes within the Asian region face many challenges. These include economic constraints, limitations in budget allocations, inadequacies in transportation infrastructure, a deficiency in significant anchor events for entertainment and sports, and stringent land availability, particularly noted in regions like Hong Kong. Additionally, the demographic dynamics, especially in ageing populations, significantly influence and pose restrictions on the architectural and functional paradigms of these venues, where the imperatives of accessibility and inclusivity become increasingly critical.

Establishing such multifunctional sports, recreation, and cultural clusters is poised to profoundly influence the urban landscape and local community life. The impacts of these developments extend beyond mere economic growth, characterised by an expansion in business opportunities and increased revenue flows. More importantly, these complexes are pivotal in fostering social integration, enhancing community well-being, promoting active lifestyles, and diminishing social isolation among residents. Collectively, these benefits contribute substantially to the community's overall physical and mental health.

Given these insights, future development strategies for multifunctional sports, cultural, and community clusters must incorporate comprehensive planning that addresses these diverse challenges. Recommendations derived from current studies suggest a multidimensional approach encompassing economic, social, and demographic considerations to ensure the successful integration of these complexes into the broader urban fabric, ultimately enriching the quality of life and vibrancy of community interactions, and can be divided into the following categories:

- i. Venue program
- ii. Urban connection
- iii. Female integration
- iv. Functional integration
- v. Cultural integration.

Each category brings its specific value to the general concept of the urban development of the precinct.

4.2 Venue program

A thoroughly detailed venue program is crucial and should be meticulously developed before the commencement of preliminary design. This foundational program should extend beyond the standard requirements of feasibility studies and specifications for hosting major sports events. To foster a deeper connection with the community and enhance the utility of the sports complex, the venue program should incorporate several comprehensive components:

- i. Stakeholder Feedback: Initiate extensive interviews with all potential stakeholders to gather a

broad spectrum of insights. This feedback should influence the planning process to ensure the final design resonates with those who will use, live near, or otherwise be impacted by the development. Understanding stakeholder expectations will guide the creation of a venue that truly serves its community.

- ii. Cultural Integration: Evaluate the possibility of integrating aspects of local and national life, including cultural traditions and community practices, into the venue's design. This integration helps to anchor the venue within its cultural context, making it a landmark that reflects and honours local identity and heritage.
- iii. Demographic Analysis: Conduct a detailed demographic review that includes current data and projections for the next 20-30 years. This analysis should account for potential shifts in population age, density, and diversity to ensure that the venue can serve future generations as effectively as it serves today's population.
- iv. Inclusivity Interviews: Engage with individuals of diverse abilities to reconceptualise inclusivity and accessibility. Instead of meeting the bare minimum standards required by law, view these interviews as an opportunity to innovate in creating safe, welcoming, and engaging spaces for everyone, irrespective of their physical or mental abilities.
- v. Functional Comparison Table: Construct a comprehensive table outlining the required spaces for hosting various events, including major sports competitions, concert shows, and cultural and community events. This comparison will highlight functional overlaps and differences, facilitating the design of versatile and multifunctional spaces that can adapt to various uses.

Through these measures, the venue program will not only comply with all necessary regulations but will also significantly contribute to the social fabric and vibrancy of the community, ensuring long-term relevance and sustainability.

4.3 Urban connection

The significance of barrier-free and traffic-free connections between the city, neighbourhood, and the Stadium of Arena sports precinct cannot be overstated. These connections can create safe and welcoming public spaces when carefully planned in the project's early stages. The project can ensure the precinct is a community-centric space by directing the flow of General Spectators away from the residential zone and separating service vehicles from the primary public access during non-event days.

In the SEA region, characterised by its hot and humid climate, large open plazas have traditionally been viewed unfavourably, as they often need to provide more comfortable and engaging environments for visitors. To enhance visitor attraction and retention, it is advisable to design smaller, shaded zones that offer a variety of activities catering to people with different abilities. These areas should be conducive to relaxation and leisure and actively invite participation from all community segments.

Historically, these spaces have primarily catered to children and youth. However, given the global demographic shifts toward an ageing population, there is a growing need to incorporate features that appeal to older adults. Developing rehabilitation sports grounds and active zones with specialised equipment for senior visitors is increasingly essential. These facilities should be designed to be equally beneficial and accessible, fostering engagement among seniors.

Moreover, integrating step-free and short walkways that directly connect these zones to residential areas is essential. Such infrastructure encourages regular visitation by senior community members, enabling them to engage in various activities, whether in groups or individually. This approach not only enhances the venue's physical accessibility but also promotes social interaction and active living among older residents, thereby enriching their quality of life and integrating them more fully into the community fabric.

4.4 Female integration

The cultural context and increasing enthusiasm for sports and social activities among the female population in the SEA region necessitate specific architectural and design considerations for public and community-use zones within stadiums and their broader precincts. Architectural planning for these areas must prioritise the needs of amateur female athletes of varying ages, mothers with children, senior women, and families with members who have disabilities. Ensuring these zones are safe, well-lit, and free from obscured areas enhances security and accessibility for all users.

Facilities such as amenities and changing rooms, when gender-segregated, should include additional family blocks explicitly designed for visitors with special needs and parents assisting opposite-gender children with disabilities. This thoughtful design respects privacy and safety and fosters an inclusive environment conducive to family participation.

Moreover, establishing dedicated safe training zones and specialised playgrounds tailored for female users encourages ongoing participation in sports among teenage girls. It increases visitor traffic on non-event days, thereby strengthening community bonds. Developing fully accessible and inclusive sports halls with suitable amenities further enhances these efforts. Such facilities enable individuals with physical and mental or intellectual disabilities to engage in sports and cultural activities alongside their families and friends. This inclusive approach substantially elevates the community's impact on the life and vibrancy of the stadium and sports precinct, making these spaces central to communal interaction and engagement.

4.5 Functional Integration

One highly effective strategy for ensuring regular visitor traffic to a stadium is the integration of multifunctional zones within the main venue. These zones can include a health clinic, potentially linked with a sports rehabilitation centre offering programs for residents. Additionally, incorporating libraries with free public access and dedicated study areas caters to the educational needs of the youth. Educational facilities, sports schools, and sports academies are also crucial, nurturing talented athletes from an early age and fostering a strong sports culture.

Moreover, cultural and exhibition halls and retail zones that operate daily can transform a stadium into a vibrant community hub, enhancing its utility beyond traditional sports events. The strategic placement of sports academies near training and competition zones used by professional athletes provides an invaluable opportunity. This allows for open training sessions where children and members of national teams can interact, significantly boosting interest in sports among younger generations.

The intentional intersection of these diverse flows during the planning process does place additional demands on operational services. However, the benefits derived from such integration far outweigh the operational challenges. This approach maximises the stadium's daily usage and is pivotal in building a dynamic community space supporting sporting excellence and general well-being. This integration turns the stadium into a central node of activity that continuously engages and benefits the community, fostering a deeper connection between the stadium and its surrounding areas.

4.6 Cultural Integration

Indoor arenas are now increasingly recognised not just as venues for sports but as vital cultural hubs capable of hosting diverse events. These versatile spaces are ideally suited for concerts, shows, musicals, and theatre productions and can even function as open spaces for art galleries and cultural festivals. The deliberate incorporation of such multifaceted features into the architectural design of future buildings is crucial. This approach cultivates a vibrant cultural point of attraction that benefits not only the residents of the immediate precinct but also the broader city. Designing indoor arenas with

cultural versatility enhances their utility and appeal, transforming them into bustling centres of activity that draw visitors from various demographics and interests. This, in turn, injects vitality into the surrounding areas, fostering significant economic and social growth. A dynamic cultural venue within a community can stimulate local businesses, attract tourism, and enhance the area's social fabric by providing a communal space for engagement and entertainment.

Moreover, arenas that host a wide range of cultural activities become landmarks within the city, symbols of community and culture that can pride themselves on inclusivity and accessibility. By designing these spaces to be adaptable, they can accommodate an ever-changing roster of events and exhibitions, ensuring their relevance and sustained interest over time. The strategic development of indoor arenas as cultural rather than purely sports venues is an investment in the city's cultural capital. It enhances the quality of life for residents and positions the city as a progressive, vibrant hub on the cultural map, promising substantial returns in economic vitality and social cohesion.

Incorporating a multifunctional, inclusive, and cross-disciplinary program into the architectural design of a stadium or arena cluster enhances the integration of neighbouring precincts into the daily life of these venues. By embracing such a holistic design philosophy, sports complexes can foster a robust connection with the local community. This approach transforms these venues into vital hubs of activity and promotes community engagement and participation.

The strategic inclusion of diverse functionalities within the sports complex ensures that it serves as a site for sporting events and a vibrant community centre offering various activities and services. These could include educational programs, cultural events, and public meeting spaces, all contributing to the neighbourhood's social fabric.

Such a dynamic and integrated approach helps build community resilience by providing a platform for social interaction and bolstering the local economy through increased foot traffic and utilisation. Ultimately, this makes the sports venue an integral part of community life, ensuring its relevance and sustainability over time. This integration goes a long way in cultivating a sense of ownership and pride among residents, strengthening the communal bonds essential for a resilient society.

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