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**Understanding the Characteristics of Adaptability and Multi-  
functionality in Buildings of the Future**

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**Abstract**

Communities and their various housing needs change over time, hence they require spaces that can adapt well to those changes and even allow for a range of users to enjoy the same space at different times. This research was undertaken to appreciate the characteristics of adaptability and multi-functionality in buildings whether on a short-term, mid-term and/ or long-term basis. The methodology of the research included exploratory, empirical, and strategic inquiry. Case studies of two prominent buildings under the rich context of adaptable, multi-functional spaces in the event capital of Asia (Hong Kong) and in one of the largest megacities of Africa (Lagos) were examined. These traditional design research methods were also supported with innovative techniques like photography to help better explore existing conditions in and around the study sites. Findings of the case studies have shown that a design approach based on adaptability and multi-functionality of spaces relative to different activities for different times as well as evolving needs is possible and should be adopted, instead of allowing buildings become inefficient shells or waste products of a fast paced world.

**Key words:** adaptability, multi-functionality, time, use, buildings of the future

## 1.0 Background

Living within a community involves a collection of familiar, often repeated activities that cumulatively create a positive quality of life for every inhabitant (Etteh, 2011). Consequently, the design of schools, stores, workplaces, affordable housing, community centres, libraries, courts and arenas - where everyday activities take place - should be highly valued. In fact, by providing opportunities for social interaction via the use of texture, light, and color, and the choreography of indoor and outdoor spaces everyday buildings are brought to life without compromising the bottom line of attaining function, economy, and construction practicality (Eizenberg, 2002). Life satisfaction expert John F. Helliwell puts it this way: “we overstate the importance of material consumption”. According to him, relationships with family and friends and even joining community groups are more related to happiness and satisfaction than material wealth, and in the end, that affects productivity in the workplace and the bottom line (Hadley, 2006).

It is a matter of record that building envelopes can evolve in an organic and innovative way, adapting to the ever changing aspirations of the target population by inscribing centrality, signifying values, and giving order to the urban fabric in their role as loci for outward growth (Beadle *et al.*, 2008; Dick, 2007). Such buildings aid in the generation of an increased sense of wellbeing, belonging and neighbourhood pride particularly in low income urban, rural and migrant farmer communities, in high density neighborhoods feeling the pressure of increasing development, as well as in cities and towns in search of greater sense of identity and cohesion (Schmidt *et al.*, 2010).

A ‘building of the future’ must therefore be extremely adaptable even within a durable shell if it is to last for centuries (Kendall and Ando, 2005). According to Addis and Shouten (2004), it is a building that has been designed, constructed and maintained with thought of how it might be easily altered to prolong its life, for instance by addition or contraction, to suit new uses or patterns of use. This is especially significant because it cannot even be precisely envisaged how many uses such buildings might be put to in thirty or forty generations, which is how long buildings may last if they are both lovable and durable (Fernandez, 2003; Manewa *et al.*, 2013), hence this study.

## 2.0 Research Methodology

To appraise the characteristics of adaptability and multi-functionality in buildings over time and space, the methodology of the research included exploratory, empirical, and strategic inquiry. Specific case studies, surveys, key informant interviews and reviews of associated materials were very useful in determining the specific scenarios that aided the attainment of a functional yet aesthetically-pleasant

matrix. These traditional design research methods have also been supplemented with innovative techniques like photography to help better explore existing conditions in and around the study sites.

Other relevant secondary data from newspapers and journals, reputable internet sources, conventional statistics from government regulatory organs and archives, as well as naturalistic observations by the author also played a prominent role in the success of the work.

### **3.0 Data Collection and Analysis**

One of the oldest traditions in architecture is the use of the understood and proven precedents which are partly repeated and partly modified in the making of architecture. It should be noted that the things that will exist can be understood from what has already existed (Kashkooli and Altan, 2010).

For this research work, two notable facilities under the rich context of adaptable, multi-functional spaces in the event capital of Asia and in one of the largest megacities of Africa have been examined. The locations were chosen due to their current development index, ever increasing population and potentials for expansion of existing public infrastructure (Davison *et al.*, 2006). It is these cases that should enable the researcher to critically analyze their relevant guiding principles and therefore serve to highlight the paradigms of adaptability and multi-functionality – the aim of this study.

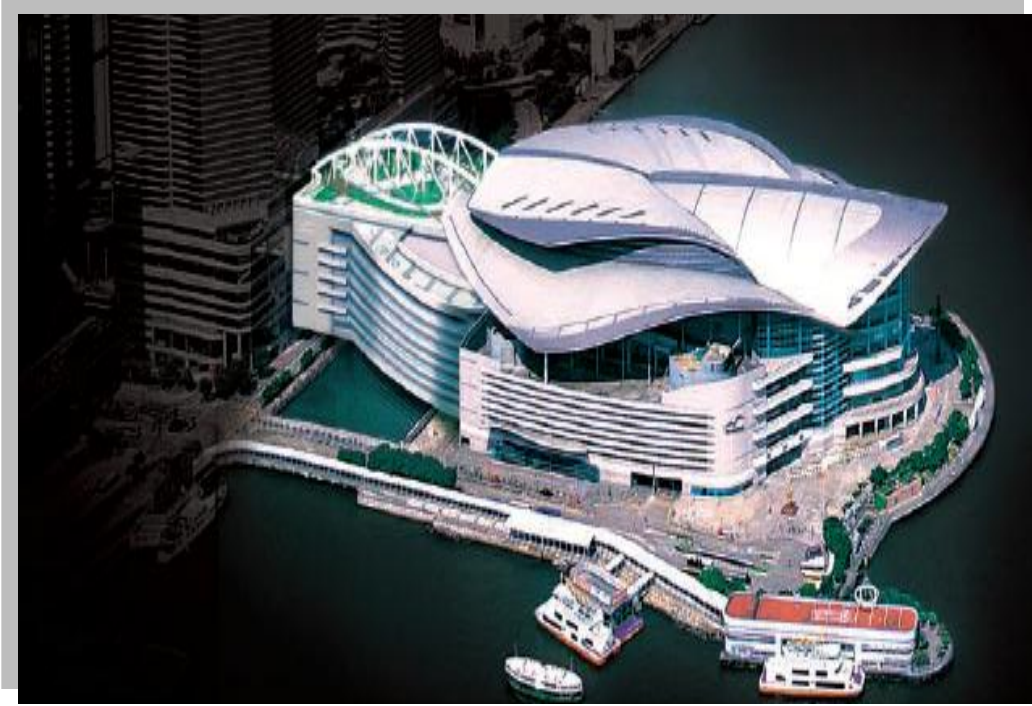
The case studies would be studied on the basis of Background Information (covering site access, socio-cultural setting and other influences) as well as Design Analysis (i.e. concept, facilities, materials, services and use of spaces).

### **3.1 Case Study #1: Hong Kong Convention and Exhibition Centre**

#### **3.1.1 Background Information**

Client:	Hong Kong Trade Development Council (HTDC) and the Hong Kong Special Administrative Region Government.
Venue Address:	1 Expo Drive, Wanchai, Hong Kong, China (Hong Kong S.A.R.) – 85254.
Area:	Around 70,000 square metres of exhibition space at 1 <sup>st</sup> Opening.

Framed by Hong Kong's skyline, the Hong Kong Convention and Exhibition Centre (HKCEC) is a magnificent, multi-use venue located in the heart of Hong Kong on its famous Victoria Harbour (Figure 1).



**Figure 1: Site Photo** (Source: <http://www.hkcec.com>)

When the HKCEC opened in 1988, the brilliant glass structure that extends out into the harbour - a spectacular backdrop for events - was designed to resemble a bird soaring into flight. Expanded in 1997 and again in 2009, the Centre is one of the largest multi-use venues in Asia and continues to be a globally recognized landmark complimenting Hong Kong's cityscape (Figures 2 and 3).



**Figure 2: 1997 Infrastructure Expansion Milestone**

Source: <http://www.hkcec.com>



**Figure 3: HKCEC December 2009 Expansion Milestone**

(Source: <http://www.hkcec.com>)

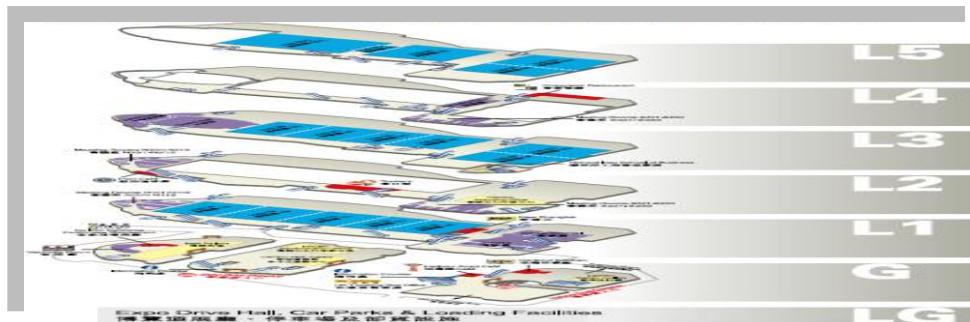
### 3.1.2 Design Analysis



**Figure 4: Photo of Centre Interiors** (Source: <http://www.hkcec.com>)

From accommodating over 25 of the world's most expensive cars for the Top Gear Live show, to dazzling an audience of over 8,000 people at rock band Air Supply's Never Ending Love Concert, the HKCEC has the capacity to provide a solid foundation for any event chiefly because all the HKCEC venues are adaptable, providing multiple set-up choices with draping systems and operable partitions to cater for both large-scale and intimate events (Geraedts, 2008). For instance, Hall 5BC can be adapted for concerts, accommodating 8,000 people with the option of a retractable telescopic seating system for 3,200 people (Figure 4).

Recently, the developers of Hong Kong Convention and Exhibition Centre have uniquely provided more than 91,500 square meters (sq. m) of rentable space right in the heart of one of the world's most exciting cities, in 6 Exhibition Halls totalling 66,000 sq. m; 2 Multi-Purpose Halls (for conventions or banquets) totalling 5,700 sq. m; 2 Theatres (with seating for 336 and 637) totalling 800 sq. m; 52 Meeting Rooms of 6,000 sq. m total floor area; as well as other multi-functional rental space measuring 13,000 sq. m (Figure 5).



**Figure 5: HKCEC Elevation Plan** (Source: <http://www.hkcec.com>)

### 3.2 Case Study #2: The Civic Centre, Lagos



**Figure 6: Vantage View** (Source: Author's Field Study, 2014)

#### 3.2.1 Background Information

Location:	Ozumba Mbadiwe Avenue, Opposite 1004, Victoria Island, Eti-osa, Lagos, Nigeria
Area:	A 2,190m <sup>2</sup> site
Architects:	M/s James Cubitt Architects.
Other consultants:	Ove Arup Partners Nigeria (Civil & Structural Engineers), Miu – Beta Engineers (Mechanical & Electrical Engineers), Austin Onaro & Associates (Quantity Surveyors)



**Figure 7: Centre Location Map** (Source: ©2015 Google Maps)

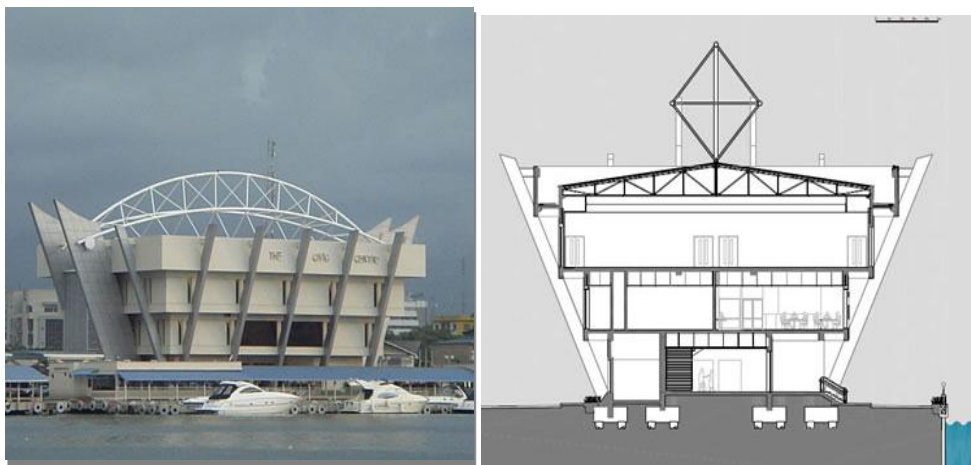
The Civic Centre is located in Victoria Island, the highbrow commercial nerve of Lagos (Figures 6 and 7). It is one of the largest and most important convention centers that graces the emerging megacity's landscape, and is still serving as venue for many national and international events in the past and offers state of art event hosting services.

### 3.2.2 *Design Analysis*

The building is a commercial development providing shops, meeting rooms, a large multi-purpose Grand Banquet Hall, a Panoramic View Hall and the Floating Restaurant overlooking the lagoon. In addition, the site also provides a private boat club.

Furthermore, the Centre boasts the latest state-of-the-art facilities with in-house technology partners offering infra-red simultaneous translation systems and wireless internet broadband connectivity as well as video conferencing that can connect all our halls. The Civic Centre offers breath-taking hospitality and service complete with incomparable value for money. This is aside from the fact that the large multi-purpose Grand Banquet Hall was designed without columns to make it conducive for events. As such, the floor slab over the hall was suspended from a large steel truss flying over the roof (Figure 8).

It must be noted also that the inverted ziggurat form of the building, according to the architects, is dictated by the limited site area.



**Figure 8: Civic Centre Photo and Section, courtesy James Cubitt Architects**

(Source: Author's Field Study, 2014)

The large multi-purpose hall as highlighted above is ideal for large corporate or grand social functions, seating 600 in banquet and at least 1,000 conference or cocktail guests



coupled with its spectacular views; it can also be re-configured to serve as a venue for the delivery of highly focused presentations, trainings, seminars or meetings to mid-size and small audiences (Figure 9).



**Figure 9: Typical Adaptable, Multi-functional Use Scenarios for the Main Hall**

(Source: Author's Field Study, 2014)



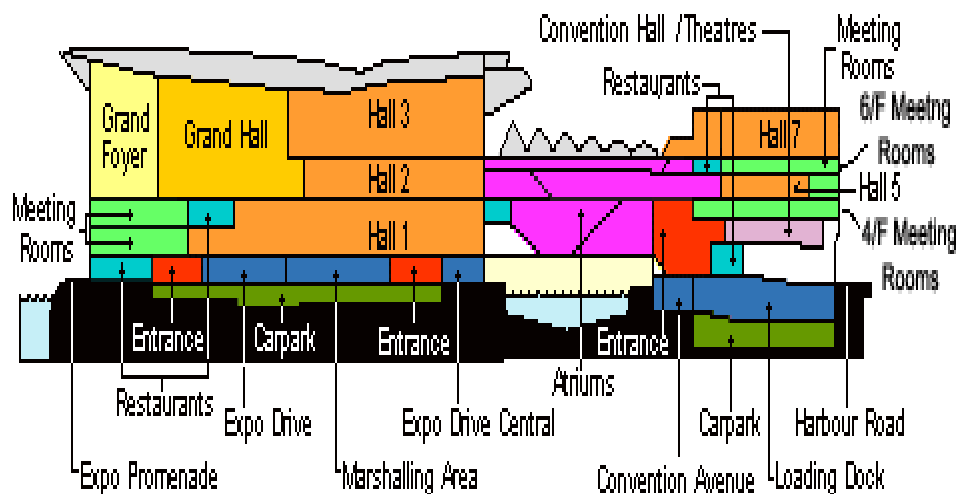
**Figure 10: Waterfront View** (Source: Author's Field Study, 2014)

The waterfront bistro also presents an ambience perfect for exclusive alfresco meetings, cocktails and socials (Figure 10).

#### 4.0 Results and Discussions

Brand (1994), Kronenburg (2000), Fernandez (2003) and Mauthoor (2010) assert that the adaptability and multi-functionality of a space is a result of highly calculated use scenarios, effectively organized program arrangements, and building systems to support each changeable spatial property; that they both “only exist within determinism, (and are) not resulted from randomness” (Kim, 2008). It is these set parameters that enabled the critical appraisal of the two case studies in terms of performance in use, aesthetics and viability of concept.

In the Hong Kong Convention and Exhibition Centre case, for instance, the complex is orchestrated in such a way that parallel sessions can be held on 4th Floor and 6th Floor Meeting Rooms in addition to the fact that all facilities are purpose-built, adaptable and multifunctional including 66,000 square metres of exhibition space, 20,000 square metres of multi-functional venues and 5,500 square metres of event support space (Figure 11). The complex was the proud recipient of the Grand Award in the non-residential category of Quality Building Award 2010 for its second expansion and a remarkable part of the judging criteria was serviceability and performance outcome. Put more succinctly, the original scheme has been so ‘adaptable’ that it has undergone three successful expansions “with further opportunities for long term infrastructural improvements” (HKCEC, 2011).



**Figure 11: Schematic Section of Functions** (Source: HKCEC, 2012)



**Figure 12: Aerial View of the Civic Centre, Lagos**

(Source: Author's Field Study, 2014)

In the same vein, findings from the Lagos Civic Centre studies showed the facility as an artistic venue for the performance of several multi-level functions like shopping activities and bazaars, art exhibitions, conferences, wedding receptions, and such other social events. Its strategic layout in location and form also gives it credence as an iconic, well-loved and well-used building of the future in the city of Lagos (Figure 12). Moreover, its exceptionally column-free main hall enables varied configurations of seating for any event and confers on it the status of a “vastly adaptable space” (Gosling, *et. al.*, 2008). Part of the fringe benefits for the management is the highly priced on-site car parking spaces for all users.

### **Conclusion**

Taking into cognizance the wide variety of activities that take place in “buildings of the future” relative to space, it becomes obvious that many other existing public facilities operate in segregated, disjointedly patterned ensembles resulting in wastages of available spaces and idle investments whenever such predetermined activity is not held. This research has shown that a design approach based on adaptability and multi-functionality of spaces relative to different activities for different times as well as evolving needs should be adopted rather than letting buildings become inefficient shells or waste products of a fast paced world. It is these qualities that will engender them to stand out as robust, thus allowing for the adaptations of flexible configuration of occupancy because of their use for different forms of interaction between respondents of different sizes and mix, whether on a short-term, mid-term and/or long-term basis.

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