The Tall, Polycentric City: Dubai and the Future of Vertical Urbanism

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Abstract
The development pattern of Dubai, host city of the 2018 CTBUH Middle East Conference core program, typifies the polycentric city phenomenon more than most cities. This paper analyzes the conditions and characteristics of Dubai’s tall polycentrism. A longer version with more contextual analysis appears as the introduction to the Proceedings of the Conference, see store.ctbuh.org/2018-middle-east-proceedings.

Keywords: Polycentric, Urban Habitat, Urbanization, Density

Introduction

The concept of polycentric cities is not new. New York developed both its Downtown and Midtown in differing waves of development, and London was polycentric almost from its origin. However, even New York and London are seeing several new urban clusters shift the centers of gravity around the city whole, as other cities based on the core-CBD model – Hong Kong for example – shift density out beyond the established center. Numerous cities now have new skyscraper districts as part of these polycenters. The physical manifestation of this is often an undulating skyline, with density rising to a series of apexes across the city.

There is perhaps nowhere that demonstrates this concept better than our host city for the core of the 2018 conference, Dubai. Indeed, it could be argued that Dubai, a city that has largely risen in just three short decades, is a direct result of this decentralized urban approach, comprised as it is of evocative-sounding districts – Downtown Dubai; Business Bay; Dubai Marina; Festival City; Palm Jumeirah; and several others. New "centers" are still being added, including Midtown; Emirates Business Park; Meydan One; and Dubai Creek Harbour, anchored by the under-construction Dubai Creek Tower.

Equally as important as the centers themselves is the infrastructure that connects them. To enable the creation of new urban centers that match the socioeconomic intensity of longstanding metropolitan hubs, we must devise practical means of transportation that maximize geographical access and provide extensive city services, not just in the horizontal direction, but vertically. Such systems will progress the concept of transit-oriented development along a course of natural evolution, to polycentric city-building.

What is a "Tall, Polycentric" City?

This paper analyzes the phenomenon of Dubai’s polycentrism in detail. It also attempts to isolate and identify the contemporary urban phenomenon of the "tall, polycentric" city, where the undulating skylines in question display certain common characteristics, recognized colloquially or formally by their populaces and governing authorities, respectively; which are reconciled with data from the CTBUH Skyscraper Center and other sources.

A definition of "tall, polycentric" city is first needed to limit study areas to the locations with the highest development intensity and velocity of vertical development, and to distinguish "polycentrism" from mere "sprawl." For the purposes of this research, then:

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A "tall, polycentric" city has three or more "clusters" of tall buildings that are clearly separated, visually and geographically. A "cluster" is a group of buildings that is significantly taller than the surrounding urban fabric, and is visually and geographically distinct, with at least five buildings (completed
or topped out) of at least 100 or 150 meters, depending on the local height context.

The determination of a local context that is used to define individual tall building clusters is both a numerical and observational operation. In general, if a city’s 100 tallest buildings have an average height of 200 meters or greater, the default determination is that 150 meters should be the minimum height threshold for consideration of a group of tall buildings as a ‘cluster.’ Likewise, cities whose 100 tallest buildings average less than 200 meters in height are generally assigned a 100-meter minimum height threshold for consideration of clusters.

Dubai is somewhat unique, in the sense that the boundaries of high-rise clusters in Dubai are much easier to delineate than in other cities, because the terrain is mostly flat, and there is a great deal of horizontal separation between clusters. Its 100 tallest buildings also have an average height of 265.4 meters, which would place the cutoff for cluster consideration at 150 meters and higher, from an objective standpoint. But from the perspective of visual coherence, the interpretation is different. Other cities with a particularly high average building height (such as New York and Hong Kong) tend to have a “carpet” of tall buildings, from which a few pinnacles rise. However, due to its distinctly separate tall building clusters, Dubai is assigned 100-meter minimum threshold, which ensures inclusion of a greater number of buildings within a visually discernible cluster.

Dubai’s Polycentrism – An Overview

Dubai (see Table 1 and Figure 1) can be thought of as a linear array of tall building clusters, stretching some 35 kilometers from the International Airport to the southern end of Dubai Marina, along Sheikh Zayed Road, a broad thoroughfare that in some places is wide enough to form the boundary between clusters; in others, it’s the main street. In many cases, the clusters are easily identifiable, not just on the skyline physically, but also because they are name-branded comprehensive developments by single developers that are practically small cities. From north to south, these clusters are: Deira, Al Satwa & Dubai International Financial Centre (DIFC), Downtown Dubai & Business Bay, Barsha Heights, Dubai Marina, and Jumeirah Lakes.

Dubai’s development pattern is fairly unique, and its speed and scale are even more so. Its development pace reflects a conscious strategy to build on the city’s foundation as a trading port, while also becoming a financial and tourism hub. The dredging of Dubai Creek in the 1950s, the construction of the Dubai International Airport in 1960, unification of the seven emirates into the United Arab Emirates in 1972, and the opening of the Port of Jebel Ali in 1979 are

<table>
<thead>
<tr>
<th>Metropolitan area</th>
<th>Name of cluster</th>
<th>Number of 100 m+ buildings in cluster</th>
<th>Combined height of 100 m+ buildings in cluster (m)</th>
<th>Average building height in cluster (m)</th>
<th>Tallest building within cluster (completed or topped out)</th>
<th>Height (m)</th>
<th>Completion year</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dubai</td>
<td>Downtown Dubai &amp; Business Bay</td>
<td>88</td>
<td>17,434.95</td>
<td>198</td>
<td>Burj Khalifa</td>
<td>828</td>
<td>2010</td>
<td>office/residential/hotel</td>
</tr>
<tr>
<td></td>
<td>Dubai Marina</td>
<td>87</td>
<td>15,854.30</td>
<td>182</td>
<td>Marina 101</td>
<td>425</td>
<td>2017</td>
<td>residential/hotel</td>
</tr>
<tr>
<td></td>
<td>Jumeirah Lakes</td>
<td>61</td>
<td>9,599.66</td>
<td>157</td>
<td>Almas Tower</td>
<td>360</td>
<td>2008</td>
<td>office</td>
</tr>
<tr>
<td></td>
<td>Al Satwa &amp; DIFC</td>
<td>55</td>
<td>10,968.28</td>
<td>199</td>
<td>Gevora Hotel</td>
<td>356</td>
<td>2017</td>
<td>hotel</td>
</tr>
<tr>
<td></td>
<td>Barsha Heights</td>
<td>9</td>
<td>16,28.55</td>
<td>181</td>
<td>Business Central Towers</td>
<td>265</td>
<td>2008</td>
<td>office</td>
</tr>
<tr>
<td></td>
<td>Deira</td>
<td>9</td>
<td>985.82</td>
<td>110</td>
<td>Deira Tower</td>
<td>135</td>
<td>1980</td>
<td>government</td>
</tr>
</tbody>
</table>

6 Clusters 309 56,471.60

Note: A different color is used for each cluster as per cluster location map.

= Highest value in column  = Lowest value in column

Table 1. Dubai’s tall building clusters, containing at least five buildings of 100 meters or greater height.
The Palm Jumeirah
Sheikh Zayed Rd.
Jumeirah Lakes
Barsha Heights
Al Satwa & DIFC
Deira
Downtown Dubai & Business Bay
Dubai Marina
Jumeirah Lakes
Dubai International
Airport

Figure 1. Map of tall building cluster locations in Dubai. Each cluster consists of at least 5 buildings of 100 meters or greater height. The size of individual dots corresponds to the height of each building. See also detailed cluster maps to follow.

Deira Tower
(135 m, 1980)
- Tallest building:
- No. of 100 m+ buildings:
- Combined height of buildings:
- Average building height:

Deira Twin Towers, Tower 1 & 2
(102 m, 1998)
Arbiif Tower
(105 m, 1982)
National Bank of Dubai
(124 m, 1998)

Al Maktoum Rd.
Omar Bin Al Khattab St.
Baniyas Rd.
Dubai Creek
Hospital Rd.
Al Khail Rd.
Financial Center Rd.
Al Safa St.
Sheikh Zayed Road
Al Asyael St.
Raz al Khor Rd.
Dubai Creek
Sheikh Mohammed bin Rashid Blvd.
First Al Khail Street
Abdullah Omran Taryam St.
Hessa Street
Trade Centre Roundabout

Deira
- Tallest building:
- No. of 100 m+ buildings:
- Combined height of buildings:
- Average building height:

Deira Tower
(135 m, 1980)
- No. of 100 m+ buildings:
- Combined height of buildings:
- Average building height:

Dubai World Trade Center
(149 m, 1979)

Emirates Tower 1
(355 m, 2000)
Al Yaqoub Tower
(328 m, 2013)
Gevora Hotel
(356 m, 2017)
The Index
(326 m, 2010)

Downtown Dubai & Business Bay
- Tallest building:
- No. of 100 m+ buildings:
- Combined height of buildings:
- Average building height:

Burj Khalifa
(828 m, office/residential/hotel, 2010)
Vision Tower
(260 m, 2011)
Meera Tower
(213 m, 2018)
Noora Tower
(307 m, 2018)
Al Habtoor City Complex
U-Bora Tower 1
(263 m, 2011)
Amna Tower
(307 m, 2018)

Barsha Heights
- Tallest building:
- No. of 100 m+ buildings:
- Combined height of buildings:
- Average building height:

Business Central Towers
(265 m, office, 2008)
JW Marriott Emirates Park Towers
(355 m, 2013)

Dubai Marina
- Tallest building:
- No. of 100 m+ buildings:
- Combined height of buildings:
- Average building height:

Marina 101
(425 m, residential/hotel, 2017)

Jumeirah Lakes
- Tallest building:
- No. of 100 m+ buildings:
- Combined height of buildings:
- Average building height:

Almas Tower
(360 m, office, 2008)
Elite Residence Tower
(381 m, 2012)
23 Marina
(392 m, 2012)
Marina 101
(425 m, 2017)
Princess Tower
(414 m, 2012)
Cayan Tower
(306 m, 2013)
DAMAC Heights
(335 m, 2018)
Marina Gate II
(258 m, 2019)
Marina Gate I
(207 m, 2018)

Dubai International Airport
National Bank of Dubai
(124 m, 1998)
Tiffany Tower
(182 m, 2009)
Lakeshore Tower 1
(165 m, 2009)

Note: Size of dots correspond to building height

Figure 2. Detailed map of Deira cluster.
considered major milestones in the city’s development. The floodgates truly opened in 2002, however, when the real estate market was converted from a quasi-feudal system controlled by the sheikhs, from which foreigners could only rent; to a system more reminiscent of market economies in the West, in which anyone could buy property. Between 2002 and 2008, the city’s population doubled and its urbanized footprint quadrupled (Brook 2013). By 2008 (the date of the previous CTBUH Middle East Conference), 144 buildings of 100 meters or greater height had been constructed in the city’s entire history to date. From 2009 to mid-2018, 184 such buildings had been built (CTBUH 2018).

This strategy was further propelled by the establishment of several free-trade zones, which observe Western customs within their boundaries. Some of the clusters identified in this report, such as Dubai International Finance Center (DIFC) and Jumeirah Lakes/ Dubai Multi-Commodities Center (DMCC) can attribute much of their tall building population to these policies.

Because of the tendency to grant enormous swaths of land at once to a group of development companies with deep government and cultural ties, in Dubai there is an unusually strong correlation between the colloquial understanding of district boundaries and tall building clusters in the popular imagination, and that of the official designations of these places. In Dubai, city-scaled clusters are promoted as brands with distinct identities and marketing apparatuses, as a one-off gated community or consumer product might be marketed in most of the rest of the world. These distinctions are further enforced by the massive scale of the developments themselves, their tendency to be centered around a distinctive tall building or buildings, or a manmade water feature, and the huge distances separating even neighboring developments. This high correlation is also likely reinforced by the automobile-dominated mode of passage from one place to another; even the Dubai Metro has station names that reflect not just the development names, but sometimes the names of the development companies themselves (e.g., DAMAC Properties). The high temperatures, hostile terrain and long distances mean that one does not simply wander the streets and form a human-scaled mental map with the skyline as a distant reference point. By default, one is almost always pointed toward an icon-centered group of buildings on the horizon, in an air-conditioned vehicle.

Deira

Deira (see Figures 2 and 3) is the original core city of Dubai, which still contains some traditional architecture, narrow streets, and the Gold Souk that have long been part of its historic trading culture. It also contains the city’s first crop of tall buildings, nine of which are 100 meters or higher, with Deira Tower (1980) rising highest, at 135 meters. At that time, the city’s population was only 276,300; it is now more than 4.6 million (GRC 2018). It is unlikely that Deira will grow much higher now; a good portion of the district is in the flight path of Dubai International Airport, which has since become one of the world’s busiest and is perhaps the largest single driver of Dubai’s economic boom, handling 88 million passengers in 2017. It is telling that Dubai is busily enhancing capacity at Al Maktoum International Airport, some 37 kilometers away, which will cover more than 10 times as much area and handle more than twice as many passengers.

“The high temperatures, hostile terrain and long distances mean that one does not simply wander the streets and form a human-scaled mental map with the skyline as a distant reference point in Dubai. By default, one is almost always pointed toward an icon-centered group of buildings on the horizon, in an air-conditioned vehicle.”
Dubai Marina
- Combined height of buildings: 15,854 m
- No. of 100 m+ buildings: 87
- Tallest building: Marina 101 (425 m, residential/hotel, 2017)

Garn al Sabkha St. (306 m, 2013)
Cayan Tower
West Lake (414 m, 2012)
Princess Tower (381 m, 2012)
Elite Residence Tower
East Lake
Sheikh Zayed R. Road
Lake Allur

Average building height: 1,629 m
- Combined height of buildings: 9,600 m
- No. of 100 m+ buildings: —
- Tallest building: Jumeirah Lakes Tower (360 m, office, 2008)

DAMAC Heights
Almas Tower (360 m, office, 2008)
Marina Gate I (392 m, 2012)
23 Marina
Al Nassem Rd (265 m, 2008)
First Al Khail R. (207 m, 2018)

Average building height: 198.12 m
- Combined height of buildings: 17,435 m
- No. of 100 m+ buildings: 88
- Tallest building: Downtown Dubai & Business Bay

Burj Khalifa (828 m, office/residential/hotel, 2010)
JW Marriott Emirates Marquis (307 m, 2018)
Amna Tower (263 m, 2011)
U-Bora Tower 1 (260 m, 2011)
Vision Tower
Al Asala St.

Al Satwa & DIFC
The Al Satwa District (see Figure 4) was the first area of Dubai outside the original urban core to be developed with high-rises, beginning with the Dubai World Trade Centre (1979) at its northernmost extent. A large traffic circle, Trade Centre Roundabout, marks the northern boundary. From here, a row of towers marches down both sides of the 12-lane Sheikh Zayed Road to Al Safa Street/Financial Center Road, where a massive cloverleaf interchange provides a break in the urban topography. The DIFC is a purpose-built development with independent financial regulation and jurisdiction, intended to bring global businesses to Dubai. It contains the Jumeirah Emirates Towers (see Figure 5), an important commercial complex that was the first to break the 300-meter threshold, in 2000. The row of tall buildings across the road is more of an ad-hoc development, consisting largely of hotels servicing the DIFC. The two corridors of tall buildings are gathered into one “cluster” however, at the scale of Dubai, they read as one on the skyline. The entire strip is “only” two blocks wide, although the block northwest of the highway is 100 meters deep and the block to the southeast is nearly 300 meters deep. Some 55 buildings of at least 100 meters are in this cluster, topped by the 356-meter Gevora Hotel, the tallest hotel-only building in the world.

This arrangement provides a useful discussion point for the Dubai urbanization phenomenon. At the scale of Dubai, Sheikh Zayed Road is actually the unifying element, akin to 5th Avenue in New York, running through an “urban canyon,” whereas in a typical Western city it would be a divider. The buildings orient their “front doors” to the massive highway, which, although impassible to pedestrians across most of its length, is bridged at the World Trade Centre, Emirates Towers and Financial Centre Metro stations. The Dubai Metro is largely an above-ground system, running parallel to major roads, with air-conditioned stations.

Downtown Dubai & Business Bay
Downtown Dubai, developed by Emaar Properties, is perhaps the most emblematic
Figure 6. Downtown Dubai, featuring the Burj Khalifa, is perhaps the most emblematic district when it comes to the Dubai style of urban growth (see Figure 6). The city-scale development contains the Dubai Mall (the world’s second-largest by land area) and the Burj Khalifa, the world’s tallest building. Amid an artificial lake, the Dubai Fountain performs “jumps” choreographed to music at regular intervals; the Dubai Opera is situated on the shores of the lake. A phalanx of hotels and high-rise residential buildings surrounds the lakeside core (see Figure 7).

To the immediate south, Business Bay, developed by Dubai Properties, extends along Dubai Creek on both sides. Not yet complete, it is designed for more than 300,000 people. It currently contains the 355-meter Emirates Park Towers/JW Marriott Marquis Hotel (the 2018 CTBUH Conference venue), the Vision Tower, the U-bora Towers, and many more.

The combined Downtown Dubai & Business Bay cluster has the greatest number of 100-meter-plus buildings in Dubai – 88 – and, partly owing to the height of the Burj Khalifa, it is also the tallest in terms of the
cumulative height of all its buildings (17,435 meters).

**Barsha Heights**

Barsha Heights (see Figure 8) is another single-developer-led community, which was originally called Tecom and renamed in 2017. The Tecom Group is a member of Dubai Holding, which also owns Dubai Properties, developer of Business Bay. It is served by the Dubai Internet City Metro station. As the developer of Business Bay, it is served by the single-developer-led community, which was barsha heights (see Figure 8) is another single-developer-led community, which was originally called Tecom and renamed in 2017. The Tecom Group is a member of Dubai Holding, which also owns Dubai Properties, developer of Business Bay. It is served by the Dubai Internet City Metro station. As the developer of Business Bay, it is served by the single-developer-led community, which was barsha heights (see Figure 8) is another single-developer-led community, which was originally called Tecom and renamed in 2017. The Tecom Group is a member of Dubai Holding, which also owns Dubai Properties, developer of Business Bay. It is served by the Dubai Internet City Metro station. As the developer of Business Bay, it is served by the single-developer-led community, which was barsha heights (see Figure 8) is another single-developer-led community, which was originally called Tecom and renamed in 2017. The Tecom Group is a member of Dubai Holding, which also owns Dubai Properties, developer of Business Bay. It is served by the Dubai Internet City Metro station. As the developer of Business Bay, it is served by the single-developer-led community, which was barsha heights (see Figure 8) is another single-developer-led community, which was originally called Tecom and renamed in 2017. The Tecom Group is a member of Dubai Holding, which also owns Dubai Properties, developer of Business Bay. It is served by the Dubai Internet City Metro station. As the developer of Business Bay, it is served by the single-developer-led community, which was barsha heights (see Figure 8) is another single-developer-led community, which was originally called Tecom and renamed in 2017. The Tecom Group is a member of Dubai Holding, which also owns Dubai Properties, developer of Business Bay. It is served by the Dubai Internet City Metro station. As the developer of Business Bay, it is served by the single-developer-led community, which was
Jumeirah Beach Residences, a group of oceanfront apartment buildings and hotels on the artificial island created by the dredging of the Marina. The level of placemaking is somewhat higher here than in many Dubai developments, partly due to the “marina” water feature and its associated pedestrian promenade, and also to the presence of an internal tram line. Overall, the cluster contains 87 buildings of 100 meters or greater height, with a cumulative sum of heights of 15,854 meters. Interestingly, this is about 1,851 meters less than Downtown Dubai & Business Bay, which has only one more building in the 100-meter-plus range, one of which is the 828-meter Burj Khalifa. Therefore, the average height of buildings in Dubai Marina is 182.2 meters, compared to 188.7 meters in Downtown Dubai & Business Bay (with the Burj Khalifa removed).

Jumeirah Lakes

Dubai Marina

The Dubai Marina is an “artificial canal city” built along a man-made marina that connects to the Arabian Gulf at both its ends, essentially carving an island out of the shoreline, and creating more potential for waterfront properties (see Figure 9). Mainly developed by Emaar Properties, it was designed to house more than 120,000 people, although several phases are still under construction. Here, the “clustering effect” is particularly pronounced, as it is the location of the “world’s tallest residential block,” containing the Marina 101 (the tallest in the cluster, at 425 meters), Princess Tower (414 meters), Elite Residence (381 meters), and several other supertall buildings (see Figure 10). The cluster boundary includes the Jumeirah Lakes development was created by the Dubai Multi Commodities Centre (DMCC), another free-trade zone within Dubai, although the individual towers are by multiple developers. Its tallest and best-known building is the scroll-shaped Almas Tower (360 meters), which was built to host the Dubai Diamond Exchange (see Figure 11). Overall, the cluster has 55 buildings of 100 meters or greater height, for a cumulative total of 9,599 meters of height.
An "Emerging" Cluster: Dubai Creek Harbour

The Dubai Creek Harbour development had 17 buildings of 100 meters or higher listed as either "topped out" or "under construction" as of August 17, 2018. It is fully expected that by 2021, this district will be discernible as a cluster on the Dubai skyline, in no small part due to the Dubai Creek Tower, set to rise to more than 1,000 meters, at its center (see "Talking Tall," page 54). However, at the time of this research, five buildings of at least 100 meters' height had not yet been completed.

Discussion of Results

The overall effect of tall building clusters on the urban topography varies widely, due to the scale and density of built-up areas in a given city, as well as to its natural topography. Therefore, it does not necessarily follow that the cities with the greatest number of tall buildings, or the highest overall skylines, or the greatest number of clusters, actually have the most culturally or visually distinct tall building clusters. Horizontal distances between districts or clusters, modes of transport, and the passage of time all play a role in infusing skylines with meaning.

While real-estate values, permitted uses, commuter patterns, and population densities are the 2D empirical tools of greatest use in enumerating demographic and built-environment changes in cities, the correlation of these broader patterns with the measurement of the skyline is a 3D operation, with great potential for complexity and a not-insignificant degree of subjectivity. Perception matters a great deal in reconciling the popular and statistical conceptions of place, even those with objectively gigantic identifiers.

As mentioned above, the boundaries of a high-rise cluster in Dubai are much easier to delineate than in other cities, because the terrain is mostly flat, and there is a great deal of horizontal separation between clusters. Indeed, the entire length of the island of Manhattan (21.6 kilometers) could fit easily between Deira and Jumeirah Lakes (see Figure 12). Importantly, in Dubai individual private developers have gone to great lengths to make their districts distinct. "Polycentrism" is neither a case of increasing overall urban density, nor a continuation of the low-rise horizontal sprawl that was experienced throughout the automobile era. Rather, it is a question of cities sorting out their complex economic interdependencies and cultural identities through selective concentration of mixed uses where there is available land, an intersection of transport routes, or both. Many cities have been polycentric through their entire existence; what's new is the increasing resemblance of these districts to the historical conception of a "central business district", with their own skylines. With several transportation innovations already on the horizon, from autonomous vehicles, to drones, to the "Hyperloop", it’s possible that we will see yet more reconfigurations of the urban topography in a generation’s time.

To see how Dubai's polycentrism compares to that of other global cities, see the full version of this paper in the Proceedings of the 2018 Conference at store.ctbuh.org/2018-middle-east-proceedings.

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‘Polycentrism’ is a question of cities sorting out their complex economic interdependencies and cultural identities through selective concentration of mixed uses where there is available land, an intersection of transport routes, or both.”

References


