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What Came First?...the Tall Building or the Urban Habitat?

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Abstract

This paper will examine the question, 'Did the Tall Building produce urban density or did the Urban Habitat of CBDs, with the creation of urban transit/transportation systems and stations that allowed the daily movement of large numbers of workers, produce the density that took the form of Tall Buildings'. Case studies, beginning in the late 19th century up until our present 21st century, will be discussed.

Since the latter half of the nineteenth century, Tall Buildings have been built to provide a supply of useable space in small areas at locations that are in great demand. Certain locations are in great demand because people are more productive in some activities when they are located in close proximity. Some observers have asserted that modern communication technologies have reduced the demand for close proximity and pronounced the "death of downtown." As was the case with Mark Twain, that death has been greatly exaggerated. Tall Buildings rely on two fundamental technical developments – safe elevators and high-quality steel. Elisha Otis demonstrated his safe elevator at the 1853 New York World's Fair (Otis 2011). Technical change of this type is endogenous in that it represents improvements that respond to market demand. The basic model of land use in urban economics shows that the density of development is driven by the value of land. A high land value induces the developer to conserve on the use of land. Furthermore, the evolution of the Tall Building prototype permits more capital to be installed on land and therefore enhances land value. The case studies in this essay describe the forces that produced Tall Buildings in a variety of venues.

Keywods: transportation node, density, landmark, skyline

St. Pancras Terminal in 19th century London

In 19th century London, St. Paul's Cathedral and the Big Ben clock tower were the tallest structures in the London skyline, along with the Royal Albert Hall. In 1865 the Midland Railway conducted a competition to design a 150-room hotel at their new St. Pancras Station. The railroad terminal was not located within central London but was to the northwest, in a working-class neighborhood. To the railroad's surprise, the architect George Gilbert Scott submitted a grand design for a 300-room hotel on the same size site (Jones 1992). In order for this structure to be accommodated, the height of the building had to increase. However, St. Pancras Station was constructed before the critical ingredient of the load-bearing steel skeleton frame. In 1871 the Midland Grand Hotel opened as a luxury hotel (see Figure 1). The importance of the railroad line and the landmark status of the hotel was a great success to this otherwise ordinary neighborhood. The hotel was operated for many years but then fell into decay. It has reopened with great fanfare as the St. Pancras Renaissance London Hotel and the Eurostar trains of St. Pancras International is a major transportation node for the city of London (Eurostar 2011).

Why Tall?

Provides density on the same size footprint (300-room versus 150-room hotel).
Creates a landmark to the neighborhood. The train station can be located by the clock tower of the hotel.
Is located at a transportation node.

Figure 1, St. Pancras Renaissance London Hotel
© Rocky Casale New York Times

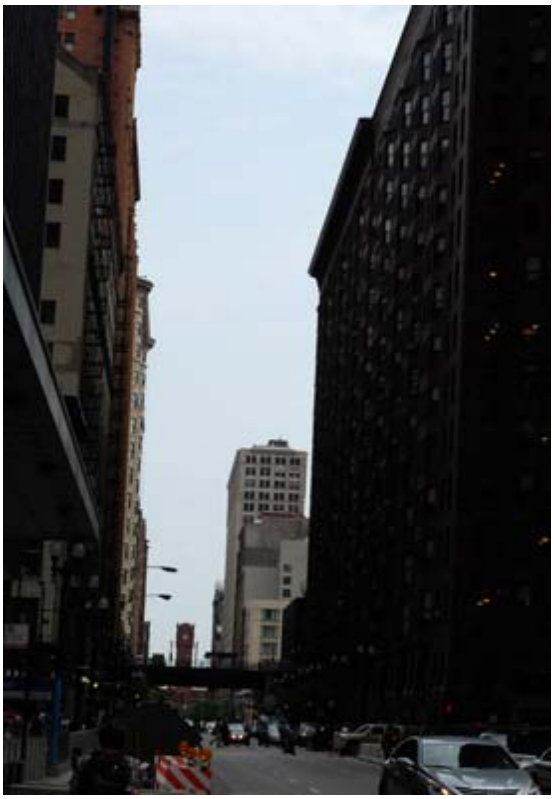

Figure 2 Monadnock (right)
with Dearborn Station in distance

The Development of Chicago's Tall Buildings

In 19th century Chicago the train terminals defined the south border of the Central Business District (CBD). Trains from New York in the east and New Orleans in the south terminated along 12th St. North of this lay Chicago's downtown, a quickly growing metropolis. In the 1890s, the elevated rail transit begins to connect the outlaying neighborhoods with the CBD. Both of these infrastructures are discussed in the Burnham Plan of 1908 as urban planning issues (Wacker 1916). The South Loop, in particular, benefited from these transportation systems.

Dearborn Station was one of these South Loop train terminals. To its immediate north were commercial buildings, known as Printers Row, which connected to its train lines. The Monadnock Building of 1891 by Burnham & Root and 1893 by Holabird & Roche is one of the Tall Buildings designed in this neighborhood (Steiner 1998) (see Figure 2). The narrow spacing of the street grid and the desire for office space are factors that pushed the limits for taller and taller buildings.

The Monadnock was one of the last to use masonry as a lateral stiffening material. The introduction of iron and structural steel was producing towers of greater heights. The Manhattan Building of 1889 by William LeBaron Jenney was the tallest office building in the world when completed (Steiner 1998) (see Figures 3 and 4). It was the first to use metal portals to resist the wind instead of masonry walls.

Why Tall?

High density at a transportation node that provides access to east and south rail lines.

Narrow street grid provides grade access and light-filled floor plates to offices above.

Figure 3 Manhattan Building (left) with Dearborn Station in distance

Figure 4 Manhattan Building

Continued Development into the 20th Century

In addition to the south train terminals, the 20th century saw the rise of the terminals west of the river, Union Station and Ogilvie Transportation Center, as thriving commuter stations (Wacker 1916). The expressway system also borders on the west edge of the CBD. As a result, the West Loop has become the regional office center of Chicago and the Midwest. Wacker Drive, the two-level roadway that follows the east bank of the Chicago River, has become the premier address for businesses in Chicago (Wacker 1916) (see Figure 5). The most famous skyscraper to rise along this stretch is Sears (Willis) Tower.

Figure 5 Two-level Wacker Drive entry of Willis Tower

In 1974 Sears Roebuck and Co. decided to relocate its many scattered offices into one headquarters. Bruce Graham and Fazlur Khan of Skidmore, Owings and Merrill (SOM) designed a bundled tube structure, with varying office floorplates, to house the retail giant (Steiner 1998) (see Figure 6). With

Wacker Drive providing two—level access , Sears Tower became a landmark in the Chicago skyline. The various sized office floors are home to many firms, including the Willis Group from London.

In 2004, in explicit recognition of the desire of office users to be close to the West Loop train stations and to further a public policy of encouraging development near major transit facilities, the zoning reform commission upzoned the West Loop to allow high densities. Subsequently, the shift of new office development to this area has accelerated and a multitude of mid and high rise structures in the area west of the train stations.

Figure 6 Willis Tower

Figure 7 John Hancock Center
with neighbors on N. Lake Shore Drive

John Hancock Center on N. Michigan Ave.

In 1968 an innovative building was completed on N. Michigan Ave., north of downtown. Located in a residential neighborhood along a major thoroughfare, the John Hancock Center became the first of a new phase in Tall Buildings (see Figure 7). The tower is a tube frame and houses offices, residences, retail/commercial and parking (Steiner 1998). Initially designed to be office and residential towers on the same site, Bruce Graham and Fazlur Khan of SOM determined to create a unified structure to house both. The resulting sloped tower is one of the first tube structures and provides multiple separate entrances for the several uses. The Hancock accelerated the acceptance of high rise residential living in the Central Area of Chicago, fueling growth of several thousand units per year until the recent economic downturn. Interestingly, it did not lead to more office development – the office development shifted to the West Loop as detailed above.

Why Tall?

High density at preferred locations.
Multiple levels/entrances to access the low, mid, and high floors/uses.
Spectacular views of the city.
Landmarks define the city's skyline.
Proximity to the major commuting train stations fueled office development.

The Rise of New York City

Like Chicago, New York City was also becoming a city of skyscrapers by the end of the 19th century. Indeed, the demand for floor space was even stronger in New York than in Chicago. The concentration of towers was in Lower Manhattan, at the heart of the commercial activity. The record for the world's tallest building was set and reset in New York by the Park Row Building (1899), the Flatiron Building (1907), the Metropolitan Life Building (1909) and the Woolworth Building (1913). Between 1910 and 1930, developer A. E. Lefcourt built 31 structures in the area that covered 150 acres and supplied 100 million square feet. New York harbor became the leading entrypoint to America from Europe. As a result, the development of the harbor and the land adjacent to it greatly increased in value. Along with the development of the Manhattan subway system and South Ferry, Lower Manhattan rose to heights no city had seen before (MTA 2011) (see Figure 8). It was the place to do business and became accessible via the transportation systems. Here the office density created canyons, resulting in zoning codes to direct development. By 1930, the tallest building in this dense forest was the Bank of Manhattan designed by H. Craig Severance (100 Tallest 2011) (see Figure 9, green pyramid top) now named the Trump Building. The World Trade Center site is located on the western edge of Lower Manhattan, over a transportation node of New Jersey trains (PATH) and a subway station.

Figure 8 Lower Manhattan in 1950
© Downtown-Lower Manhattan Association and Rockefeller Foundation

Figure 9 Lower Manhattan with Bank of Manhattan (green pyramid roof on right)
© Flickr Photo

Race to be Tallest - Chrysler and Empire State

New York City saw the completion of three World's Tallest Building within a very short timeframe. Shortly after the completion of the Bank of Manhattan, the Chrysler Building designed by William van Alen surpassed its height (100 Tallest 2011) (see Figure 10). Located in Midtown a block from Grand Central Station and a subway station, it is an office building that is not associated with the businesses of Lower Manhattan. Chrysler is an auto manufacturer and provided space for Midtown tenants. Separated from the mass of Lower Manhattan, it stands as a landmark in the skyline (see Figure 11).

Figures 10 & 11Chrysler Building © Antony Wood CTBUH

In 1931 another landmark was completed in Midtown. Between Penn Station and Grand Central Station sits the Empire State Building designed by Schreve, Lamb and Harmon (100 Tallest 2011) (see Figure 12). Until the completion of Sears Tower it was the tallest building in the world. Like the Chrysler Building, it enjoys views of the city because it is separated from other tall buildings. It also benefits from excellent transportation options within a few block radius. The iconic top has become a symbol of New York City to the world (see Figure 13). While not financially successful initially, it is now a desirable location and has become a symbol of green technology (Rode 2010).

Figures 12 & 13 Empire State Building in Midtown © Antony Wood CTBUH

Why Tall?

Creates density at the location of commercial activity.
Located next to/over transportation nodes.
Spectacular views of the city.
Landmarks define the city's skyline.

Union Terminal Tower in Cleveland

In 1928 the Van Sweringen brothers competed an office tower atop a train terminal in Cleveland. The Cleveland Union Terminal tower designed by Graham, Anderson, Probst and White, was the tallest building in Cleveland (Cleveland 2011) (see Figures 14, 15 and 16). The train terminal was a unified terminal that brought several train lines to a single destination. The complex also included retail, a post office and a hotel. In this respect, it became not just the tallest building in Cleveland but its complex became one of the most important to the city.

Over the years its importance has waxed and waned. The train lines no longer use the facility but rapid transit is available. Besides the office function of the tower, the complex includes entertainment and retail operations. As a city within a city, it is now known as Tower City.

Why Tall?

Creates density at a desirable transportation node.
Density creates a synergy of functions for a city within a city.
Spectacular views of the city.
Landmark defines the city's skyline.

Figures 14, 15 & 16 Union Terminal Tower in Cleveland skyline © clevelandmemory.org

Philadelphia City Hall

In 1901 the tallest habitable building to date was completed in Philadelphia. The Philadelphia City Hall designed by John McArthur, Jr. remains as an impressive masonry municipal building (see Figure 17). It houses several branches of government in almost 700 rooms. On its top is a statue of William Penn, an English Quaker who founded Pennsylvania. Not only is this building tall, it also contains symbolic meaning to the city of Philadelphia (Philly 2011).

The Penn statue faces northeast to Penn Treaty Park, where he signed a treaty with the local Native

Americans. His statue remained the highest point in the city for most of the 20th century. As a beacon to the environs, the statue of Penn and the City Hall structure convey a sense of pride (see Figure 18) and is the center of civic life within Philadelphia.

City Hall is at axis of the SEPTA system with direct access to the Broad Street, Market Street and All Routes Lines and a pedestrian linkage to Regional Rail Lines that connects to one of America's busiest intercity rail terminals – the Amtrak 30th Street Station.

Why Tall?'

Unifies several branches of government within one building.
Symbolic center of civic life.
Landmark in the city's skyline.
Close to major train transportation nodes.

Figure 17 Philadelphia City Hall
© phillyhistory.org

Figure 18 Philadelphia City Hall at night
© phillyhistory.org

Hong Kong's Harbor Lighthouses

Hong Kong has developed from a British colony to become one of the most dense and vertical cities in the world. Situated on the north and south sides of Victoria Harbor, it has become a world financial center. As symbolic lighthouses on either side of the harbor, the International Finance Center (IFC) designed by Cesar Pelli and Associates (see Figure 19) and the International Commerce Center (ICC) designed by Kohn Pederson Fox (see Figure 20) stand guard. At 88 and 108 stories, respectively, these towers are landmarks to define the harbor.

Following the John Hancock Center prototype, both of these towers are multi-use as a 24 hour /7 days a week city within the city (Malott 2010). Together they contain residences, hotels, office space, retail malls and convention centers. Below the IFC is the Union Station and below ICC is the Kowloon Station. Both of these train stations provide rapid transit within the city as well as connections to the airport and Mainland China.

Why Tall?

Symbolic lighthouse landmarks to define the harbor.
Creates density at locations of commercial activity.
Spectacular views of the city and harbor.
Located over a desirable transportation node.
Density creates a synergy of 24/7 multi-use functions for a city within a city.

Figure 19 International Finance Center (right) in the Hong Kong night skyline
© Antony Wood CTBUH

Figure 20 International Commerce Center complex over Kowloon Station
© John Luk Sun Hung Kai Properties

Shanghai's Pudong District Free Trade Economic Zone

In the 1980s the Chinese government initiated reforms that have transformed the Pudong District farmland into the Lujiazui Finance and Trade Zone. Within this trade zone are located the Shanghai Tower designed by Gensler at 121 stories, the World Financial Center designed by Kohn Pederson Fox at 101 stories, and Jin Mao Tower designed by SOM at 88 stories (see Figure 21). Like the Hong Kong towers, these structures form a 24/7 vertical, multi-use city within a city (Xia 2010).

The financial zone creates the environment for these iconic towers with international business centered within this zone. The resulting towers reflect the success of the Chinese economy in the global economic arena as well as the ability of a focused government investment policy to completely redevelop the area. The investments included extensive transportation systems such as several subway lines, an under river transit way, expressway width streets, pedestrian bridges and wide sidewalks, interior building passageways and river boats.

© Mori Corp. © Gensler

Figure 21 Pudong District on covers of 2008 (left) and 2010 (right) CTBUH journals

Seoul's Incheon Free Economic Zone

Another important Asian trade zone is the Incheon Metropolitan City, located west of Seoul, which contains Songdo International Business District. When complete in 2015, it will become its own city of residences, office space and retail as well as schools, hospitals and cultural amenities. As an emerging financial center, it is attracting global companies and it is becoming one of the major convention and tourism destinations in Asia.

In 'Aerotropolis' Kasarda and Gregg provide a discussion of New Songdo (Kasarda 2011). In the aftermath of the Asian financial crisis the International Monetary Fund provided a loan of US$58 billion to South Korea, with the stipulation that it must attract foreign investment. The South Korean manufacturing base was moving to China, so their leaders resolved to move Seoul up to the next level as a global city by making it a major center for finance, creativity, advanced business services, and deal making. New Songdo would be the instrument to make this happen. South Korean leaders could see that Seoul, with its 24 million people crowded together, undistinguished architecture, and epic traffic, would not be attractive to the global "creative class." How could it compete with Hong Kong or Singapore or Shanghai? The answer was to build a new city on land reclaimed from the ocean. The first step was to build a major airport that would link the new city to the major destinations in China. Business people can have a meeting in Seoul in the morning, fly to a major city in China for another meeting, and be back home in New Songdo in the evening.

The development was masterplanned by Kohn Pederson Fox. It is one of the largest developments in history, covering 6 sq km of reclaimed land. The centerpiece of this development is the North East Asia Trade Tower designed by Kohn Pederson Fox. At 68 stories, it is the tallest building in S. Korea (see Figure 22). It is another example of a 24/7 multi-use tower with residences, a hotel, offices and retail. A convention center is located at its base.

New Songdo is built at the same density as Manhattan, is fully "green," and has a very low carbon footprint. New Songdo has become a model for new cities in China and elsewhere.

Why Tall?

Density at financial and convention centers.
Iconic towers to define district's skyline.
Spectacular views of the surrounding district.
Density creates a synergy of 24/7 multi-use functions for a city within a city.
Focused real estate investment coupled with transit investment.

Figure 22 North East Asia Trade Tower© David Scott Arup

Conclusion

Urban Habitat created the environment for density and Tall Buildings. 19th century Chicago and New York City are examples. Waterfront locations, city rapid transit and commuter rail transportation systems, along with urban planning, enabled densities to increase in desirable financial centers. Tall Buildings became landmarks that defined a city's skyline. Vertical cities within a city developed for 24/7 multi—use synergy. 21st century cities, like Hong Kong, have benefited from planning and transportation systems that have created some of the highest densities in the world. International Free Trade Zones have also emerged that have embraced the Tall Building form.

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