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# Country Report: South Korea



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### JuHwan Cho

Since 2009, JuHwan Cho has been the CTBUH Country Representative for South Korea. He is also the founder and president of SIAPLAN Architects & Planners, founded in Seoul in 1998. SIAPLAN has various experience and achievements, and an established reputation for designing high-rise building with specialty in Korea. JuHwan also founded SIAPLAN & Associates New York design studio in 2004, which works as functional media in terms of design developments and improvements. Mr. Cho graduated with a Master of Architecture in 1980 from Korea University. He is a fellow member of KIA (Korean Institute of Architects), Diplomat of the Korean Organizing Committee for the 2002 FIFA World cup Korea/Japan and Visiting Professor at Korea University. Prior to founding SIAPLAN Architects & Planners, Mr. Cho was Senior Principal of Samoo Architects and Engineers (1978–1998).

### Kwang Ryang Chung

Kwang Ryang Chung obtained a Master of Architecture and PhD at Korea University. He has been working as an adjunct professor since 1995 at Korea University. His particular expertise is in the design and analysis of tall buildings. He has also developed techniques to optimize the size and weight of structural steel and reinforced concrete. Since joining the Shin Jong Soon Structural Institute in 1983, Dr. Chung has been working as a structural engineer and has been involved in several structural projects and analyses, including NSC NEATT in New Songdo City and HaunDae Udong in Busan, Korea. Currently, he is the President of DongYang Structural Engineer Co., Ltd.

“Despite being the capital city of South Korea and one of the most populous cities in the world, Seoul lacks a landmark project which represents its remarkable progress as a global city.”

Tall buildings, especially very tall or iconic ones, often tell a story which is bigger than just the need for space or the want for premium office. The development of tall buildings is always a good indicator of a country's economic progress, but through design, height and concept, tall buildings can also be considered an expression of culture. Tall buildings in a South Korean context are not only a matter of height, or number of floors, but moreover should be considered as the result of major advancements in economic, social and cultural development. By looking at the historic and current development of tall buildings, as well as the context in which tall buildings take shape, this overview attempts to capture that story.

## Industrialization

As in Europe after World War II, the end of the Korean War (1950–1953) marks an important milestone in the development of South Korean cities, as it triggered an economic boom which reshaped cityscapes. After the war, South Korea was faced with a challenge to rebuild itself with almost no natural resources while facing overpopulation. In the early 1960s, South Korea adopted an outward-looking strategy by trying to create an economy which was heavily geared towards exports. This strategy promoted economic growth through labor-intensive manufacturing, in which South Korea could develop a competitive advantage.

The growth of the industrial sector became the principal stimulus to economic development. Modern production technologies and newly built facilities were introduced at a rapid pace. Utilizing the newest techniques, production increased greatly, which was mostly targeted for export (see Figure 2). As a result, industry altered the country's landscape, drawing millions of laborers to urban manufacturing centers.

During the 1970s and 1980s, South Korea became a leading producer of ships, including oil supertankers, and oil-drilling platforms. South Korea eventually became the world's dominant shipbuilder with over 50% share of the global shipbuilding market. The automobile industry was another of South



Figure 1. Seoul Skyline © Antony Wood

Korea's major growth and export industries in the 1980s. Construction has also been an important South Korean export industry since the early 1960s. South Korea's largest construction companies include Samsung C&T Corporation, which built both the Petronas Towers and Burj Khalifa.

Post-war reconstruction, the introduction of foreign technology and materials, and the improvement of domestic technology were the main drivers for the first tall buildings in South Korea during the 1960s and 1970s. Completed in 1970, the 31-story Samil Building represents the start of the tall building era in South Korea.

Hosting the Asian Games in 1986 and the Olympic Games in 1988 helped increase the international status of South Korea. This caused an economic boom in domestic real estate, which also significantly increased the demand for new construction. The 249-meter (817-foot) tall KLI 63 Building (1985) (see Figure 3) and the 228-meter (748-foot) tall Trade Tower (1988) embody this era, and have laid the foundation for new buildings to follow.

### Hi-Tech

An overly strong national currency which increased wages, frequent strikes and high interest rates caused a downturn in the South Korean economy in 1989, leading to a sharp decrease in exports and foreign orders. It was the first economic hiccup in the country since the start of export-based industrialization. But a crisis can also be a driver for innovation and change. In 1990, South Korean manufacturers planned a significant shift in future production plans toward high-technology industries by encouraging the development of new industries such as robotics, bioengineering, microelectronics, fine chemistry, and aerospace. Also, in response, new automation systems were introduced to reduce dependence on labor, to boost productivity with a much smaller work force and to improve competitiveness. These actions caused the South Korean economy to be back on track by the early 1990s.

The 1990s gave South Korea international recognition and provided new challenges.

Land prices, the demand for office space, and the need for efficient land use all increased, causing an increasing need for high-rise buildings. In addition, new designs for tall buildings, improved construction techniques and the pioneering of overseas markets promised a long-term growth of the domestic construction market and related economies. This decade witnessed the construction of numerous tall buildings, such as Ssangyong Building (1994, 104 meters/459 feet), LG Gangnam Tower (1998, 173 meters/568 feet) and the ASEM Tower (1999, 165 meters/579 feet) (see Figure 4).

### An Asian Tiger

Caused by speculation and non-performing loans at many of South Korea's merchant banks, economic fortunes changed again in 1997 with the Asian Financial Crisis. By January 1998 the government had shut down a third of South Korea's merchant banks. The response was to move away from the centrally-planned, government-directed investment model toward a more market-oriented one. Recovery from this crisis was based largely on extensive financial reforms that restored stability to markets.

South Korea was considered to be one of four "Asian Tigers," along with Hong Kong, Singapore, and Taiwan. Having been

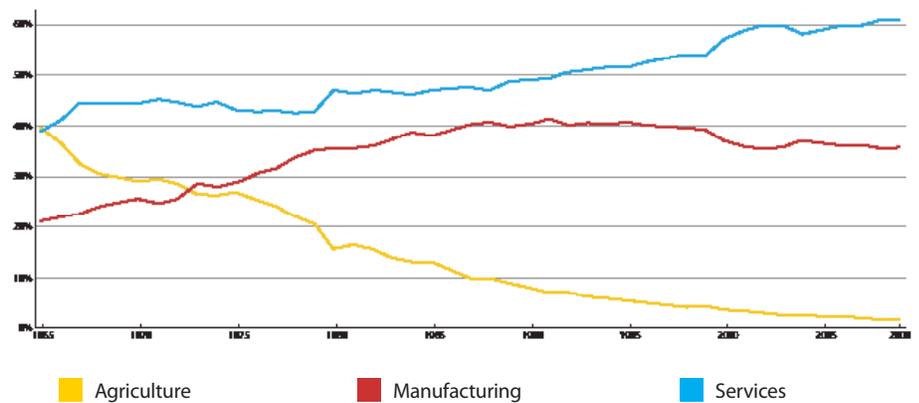


Figure 2. South Korea exports from 1965–2009 (% of GDP). Source: World Development Indicators, The World Bank



Figure 3. KLI 63 Tower, Seoul © SOM

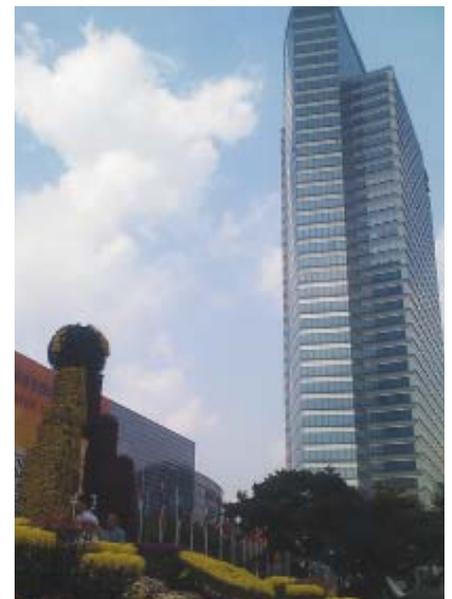


Figure 4. ASEM Tower, Seoul © Antony Wood

among the fastest growing economies from the early 1960s to the late 1990s, the country continued to be one of the fastest growing developed countries in the 2000s.

But like most industrialized economies, South Korea suffered significant setbacks during the late-2000s recession (see Figure 5). Despite the global financial crisis, the South Korean economy was helped by timely stimulus measures and strong domestic consumption of products that compensated for a drop in exports. As such it was able to avoid a recession unlike most industrialized economies, posting positive economic growth for the two consecutive years of the crisis. In an attempt to make the South Korean economy more competitive, South Korean conglomerates, called *chaebols*, are currently being restructured, banks are being privatized, and the economy is being more liberalized. HDTVs and mobile phones are among the current key export products.

### Residential Development

Since the early 1990s, the average household income in South Korea has increased dramatically, and people have started to realize a better quality of life. This development has caused a nationwide increase in the demand for luxury and mixed-use projects. The demand for large apartments in buildings over 40 stories tall increased significantly. This development helped to revitalize the construction industry and to overcome the financial problems of the private sector in the late 1980s.

Currently, of the 100 tallest buildings either completed or under construction in South Korea, 71 towers contain apartments, most towers being solely residential buildings. All but just a very small number of the 150 tallest residential buildings in South Korea have been completed since the year 2000.

The development of residential tall buildings in South Korea is an example of coping with

the fast growth of its economy, individual prosperity and changing life-style preferences. Even through the history of residential tall buildings has been a short one, an interesting development has been the new trend in building forms. Initially residential tall buildings were characterized by a fairly straightforward design especially when it comes to floor plan preferences. Later on, tall buildings started to emerge with various floor shapes, such as rectangular, Y-shape or K-type configurations, and having unobstructed views became a much sought after quality as well (see Figure 6). Currently, tall building design tends to be more sculptural and inspired by natural elements, reflecting the quality of life of the end user. The Tower Palace area in Seoul is a good example of the advancement of tall buildings in the last decade, as it was developed in several phases in the 2000s (see Figure 7).

Through design and program, residential tall buildings in South Korea can also be regarded as an expression of culture. An important influence is that Korean culture is community-based. One is always part of a number of communities, such as a big, multi-generation family, an apartment complex or a local community. When people express the things they own, or talk about the groups they belong to, they talk for example about “our” school, “our” company and “our” children. By comparison, American culture is more often expressed from an individual’s point of view. Living tall in the United States is more of an individual affair and an expression of an urban lifestyle than it is in Asian countries. Here, tall buildings often house many families with children, happy to be living in the same complex.

Combined with the size of new projects, this allows for the integration of a wide range of shared amenities into the program. Typically these may be exhibited as health and well-being facilities, a multipurpose banquet hall, a nursery, guest rooms, karaoke room, laundry room, courier service, or a library. Its purpose is not only to offer convenience to end users, but also to create a sense of community pride.

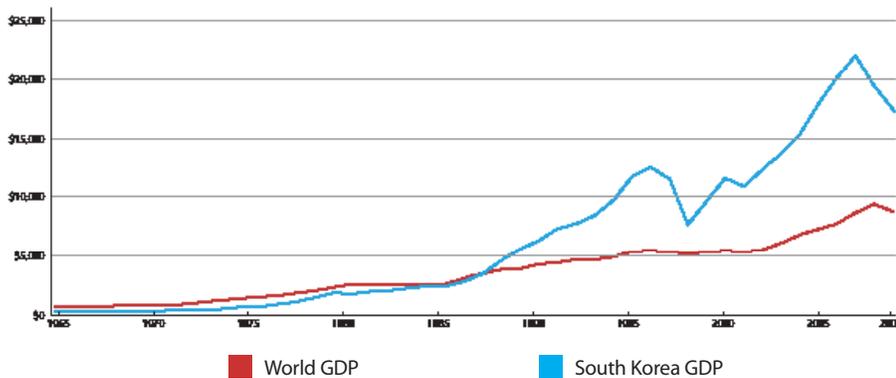


Figure 5. South Korea GDP per capita growth from 1965–2009. Source: World Development Indicators, The World Bank

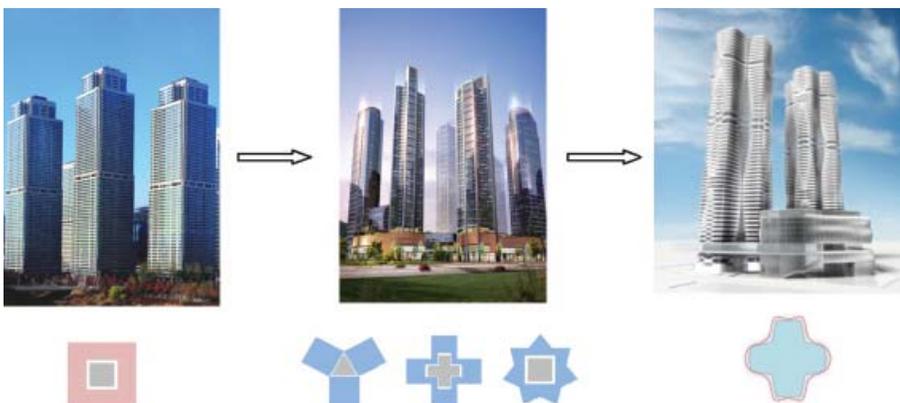


Figure 6. Various floor shape for residential towers in South Korea © JuHwan Cho

South Koreans have shown a preference for plain rectangular living spaces. Usually, this allows for the structure of a residential tall building to be shaped by a system of flat slabs coupled with a shear wall and column system, which can reach an efficient span of 8 meters (26 feet). The minimum floor-to-floor height is 3 meters (9.8 feet) with a ceiling height of 2.4 meters (7.9 feet). In South Korea, units have balconies which are not considered to be part of the usable floor area. However, in many cases a balcony is transformed into additional living space.

At the same time, an increasing demand for more compact housing units has become more apparent, representing the demands of a new generation of individual and smaller households with more purchasing power, seeking an affluent lifestyle as opposed to larger family-oriented units. Such individuality might not just be an expression of American culture, but more generally so could be explained as a sign of economic development and maturity.

### Mixed-use development

In 1991, the Korean government shaped a new housing policy allowing for the

commercial development of residential apartment housing. Combined with a growing demand for high-rise living, this caused a new trend in the Korean market. Nowadays tall buildings are often part of large entertainment areas which include cultural facilities, transit centers, department stores, and casinos. This development has not been limited to just Seoul, but also adopted throughout the country in cities such as Busan, Incheon, and semi-tropical Jeju Island. This can also be regarded as an expression of the general development of the leisure and tourist industry in Korea.

### Supertall Buildings

Supertall buildings, which are structures taller than 300 meters or roughly 1,000 feet, have become a global trend. They have created immediate landmarks for a city or a large scale urban development. This has been especially true in Asia, where they are regarded as a symbol of competitiveness. The Jin Mao Building and Shanghai World Financial Center in Shanghai, Taipei 101 in Taipei, and Petronas Towers in Kuala Lumpur are iconic monuments embodying the economic growth of their respective cities. However,



Figure 7. Tower Palace, Seoul © Samsung C & T

## ... density

“[Korean cities] want to have density because of the economy that drives this enormous amount of people and because even with growing wealth, density is needed to reduce mobility that would otherwise kill those cities.”

*Winy Maas of MVRDV commenting on “What will the future cities of Asia look like?”  
From FuturArc, 3rd quarter 2011.*

South Korea’s largest cities – Seoul, Busan, and Incheon – are currently lacking such icons. In the wake of economic growth and technological development, a number of supertall projects have been proposed in these cities in the past decade. Currently South Korea has only one completed supertall building (Northeast Asia Trade Tower) and one that has been topped out (Doosan Haeundae We’ve the Zenith Tower A), however more than four are presently under construction and 26 have been proposed, either as a project or a vision (see Figure 8).

Despite being the capital city of South Korea and one of the most populous cities in the world, Seoul lacks a landmark project which represents its remarkable progress as a global city (see Figure 1). But this is now changing as new supertall projects, such as the 556-meter (1,824-foot) tall Lotte Jamsil Super Tower currently under construction (see Figure 9), not only embody Seoul’s status as a leading city, but also raise the national prestige of South Korea.

Most of the suitable areas in Seoul for supertall buildings, such as the Central Business Districts (CBD), are considered to be too crowded to allow for the transportation of construction materials. As a result, many supertall projects were proposed and

## Korea's Future Tallest Ten

- Completed
- Topped Out
- Under Construction

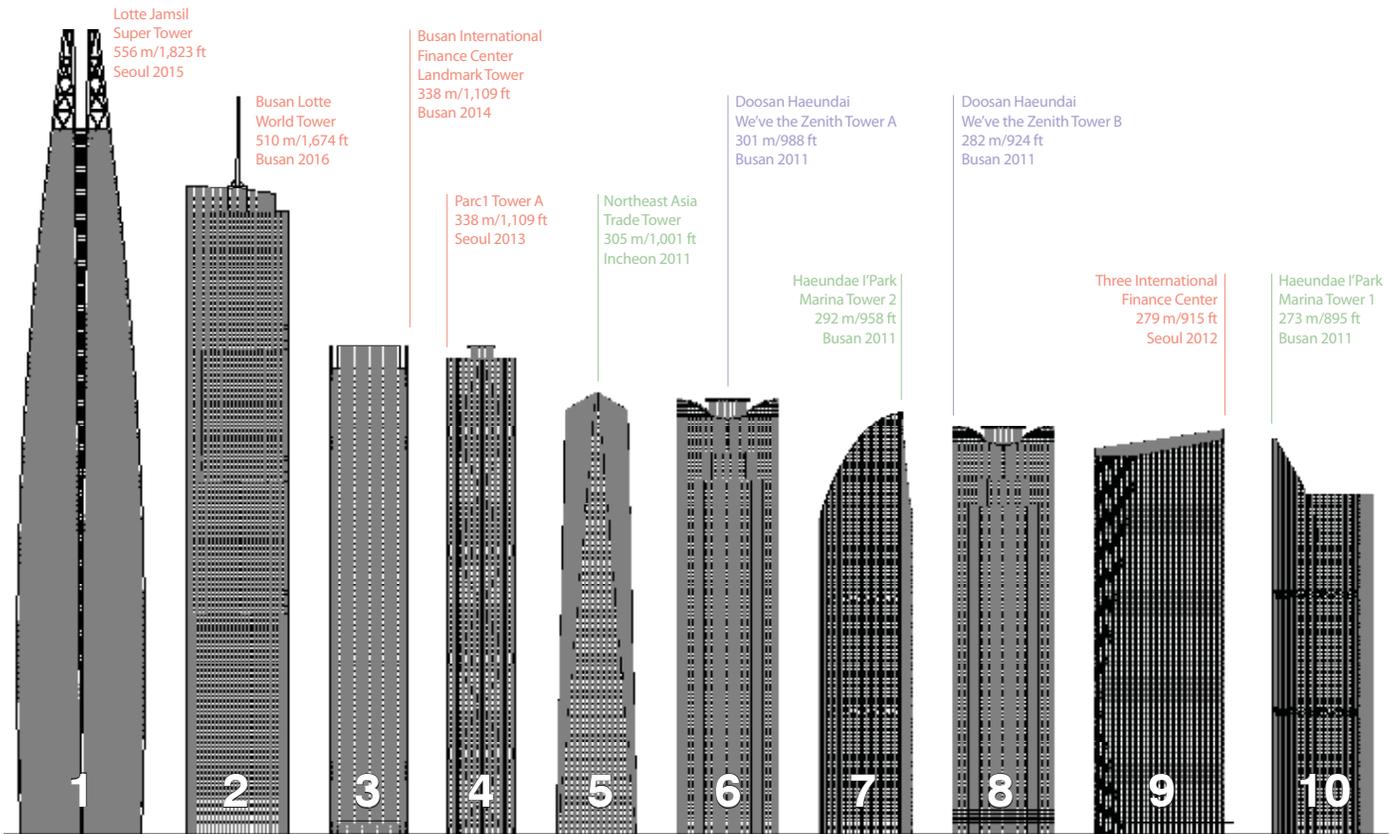


Figure 8. Ten tallest completed, topped out, or under construction buildings in South Korea, as of September 2011

approved in areas away from the CBD, even though these might not be the most desirable areas to justify high leases. The Seoul Light DMC Tower, 151-Incheon Tower and Dream Hub Archipelago Main Tower are good examples of this (see Figures 10, 11, and 12).

Because of the recent global financial crisis, but also because of some public animosity, the development of some of these projects has progressed slowly in recent years. But regardless of the financial situation of the country, some privately-funded projects, such as the Lotte Jamsil Super Tower (see Figure 9), Busan Lotte World Tower (see Figure 13), and Hyundai Global Business Center, have begun construction or will be doing so soon.

Within the Korean context, a number of considerations ought to be addressed during



Figure 9. Lotte Super Tower, Seoul © Leslie E. Robertson



Figure 10. Seoul Light DMC Tower, Seoul © SOM



Figure 11. 151-Incheon Tower © JPA



Figure 12. Dream Hub Archipelago © SDL



Figure 13. Busan Lotte Tower © SOM/Gemsvale

the development process of supertall buildings. When it comes to function, many of the residential buildings usually employ a straightforward design. A standard shape is preferred by most residents so it makes it easier to sell when they decide to move on. But when it comes to office buildings, creative design is an important component in the subtle competition between corporations. To distinguish between them, the trend has been that tall office towers should have a unique and rather irregular appearance. Large corporations, such as Lotte and Hyundai, seek extraordinary designs which often produce an iconic shape.

Supertall buildings however are often multi-functional and as such, the design tends to be distinctive no matter the main purpose. This results in a so-called freeform design, in which towers twist, tilt or taper. It took several years just to decide upon the design of Seoul Lotte Tower, which shows that the design process is quite a delicate matter. However, irregular shaped buildings are costly to build, and making these projects financially feasible can be quite a challenge. Supertall buildings are still very much the subject of study and research. New technologies and design aesthetics are constantly evolving, now

allowing for shapes which weren't possible before.

Another issue which needs to be addressed in the Korean context is wind. Busan's average wind velocity is 40 meters per second (131 feet per second), while Seoul's average wind velocity is 30 meters per second (98 feet per second). This means that tall buildings in Busan are exposed to far greater wind loads compared to tall buildings in Seoul, consequently affecting tall building design.

Supertall buildings often require an outrigger system to resist lateral forces. This is a cantilever truss or wall, connecting the core with perimeter columns, and thus increasing stiffness by distributing lateral forces acting on the building. Because of the differential shortening effect of the outriggers spanning between the core and columns, structural engineers must examine the additional stress developing on the system by finding a new technical solution. In order to mitigate the additional stress, the most efficient and feasible joints must be applied and specially designed for such an issue. So far, most of the supertall buildings in South Korea have outrigger systems with concrete core walls for their main structural system. Although the outrigger system is highly recommended for

supertall projects, it is still problematic in terms of construction duration. Engineers must therefore figure out the appropriate number of outrigger trusses per story; number of outrigger stories per building; size; depth and materials comprising the outrigger; joint details; and MEP openings. Communication is the key to this problem highlighting the need to negotiate with other specialist parties and come up with the most efficient and workable solution.

For such large-scale projects, consultation between various expert groups is critical. If we pool our knowledge and resources, detailed cost consultation becomes available, which allows builders to provide different design options to clients, rather than just giving a total budget. In order to make this possible, the role of CTBUH is extremely important. It provides the network where engineers and architects can share their thoughts and knowledge on recent supertall projects, enabling them to come up with new ideas for further development. ■