삼성반도체 캠퍼스 설립이 공간변화에 미치는 영향 분석

- 화성, 기흥, 평택, 온양캠퍼스 사례연구

Analyses of Impact on spatial changes by the establishment of Samsung Semiconductor Campuses

- Case study of Hwaseong, Giheung, Pyeongtaek and Onyang Campus

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Abstract

In the past few decades, industrial urbanization has rapidly increased in developing countries. With northwestern Seoul-area axial points (Pangyo, Hwaseong, and Yongin) extending to Onyang in the South and Pyeongtaek in the southwest, the K-shaped belt seeks to diversify South Korea's existing map. In this thesis, we studied the impact and spatial changes in the proximity of these four K-Semiconductor valley Campuses, respectively. Results show that with the construction of these campuses, the surrounding areas were also induced with urbanization with apartment complexes occupying the most footprint, followed up by semi residential zones and commercial zones. While location of the campus played an important role, the commercial big brands acted as a catalyst for the development.

키워드 : 공간변화, 한국반도체벨트, 주거용도, 삼성캠퍼스, 인구

Keywords: Spatial change, Korea semiconductor belt, residential use, Samsung Campuses, population

1. Introduction

The South Korean exports heavily rely on the semiconductor sector, constituting approximately 20 percent of the nation's annual outbound shipments. In a strategic move to enhance the sector's competitiveness, Samsung Electronics is set to construct a new facility in Pyeongtaek, complementing existing ones in Onyang, Giheung, and Hwaseong. This initiative aims to establish the world's largest semiconductor production belt. These semiconductor campuses are concentrated in the Gyeonggi-do region, just south of Seoul, with some located in Chungcheongbuk-do and Chungcheongnam-do. The K-Semiconductor Belt, connecting Pangyo, Giheung, Hwaseong, Onyang, Pyeongtaek, and Icheon-Cheongju to Yongin, is poised to become the globe's largest semiconductor supply chain. In the past few decades, urbanization has rapidly increased in developing countries, primarily driven by population movements from rural to urban areas or vice versa, often influenced by industrial development.

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This shift results in significant alterations to land use, population density, and the lifestyles and livelihoods of local residents. Industrial development acts as a catalyst for these migrations, particularly along transportation corridors connecting major cities, fostering the transformation of areas with mixed urban and rural characteristics, known as "desakota."

1.1 Purpose of Study

This research aims to comprehend the patterns and reasons behind the revitalization and redevelopment associated with the establishment of large industrial complexes. Focusing on the K-Valley's swift industrial development, the study observes the changes induced by industrial development in neighborhoods bordering the campuses of Giheung, Pyeongtaek, Onyang and Hwaseong.
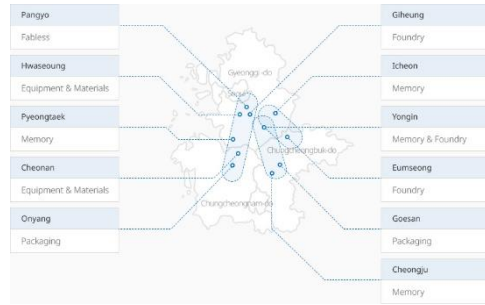
Figure 1- Korea-Semiconductor Belt, also known as K-Valley

The analysis encompasses land-use changes, zoning types, the emergence of major brands, and the construction of apartment complexes. The findings are anticipated to contribute to the literature on gentrification in suburban areas of developing countries, providing valuable insights for governments and urban/regional planners into the repercussions of industrial development in suburban regions.

2. Methods

This study employed a quantitative methodology for both data collection and analysis. The applied techniques encompassed satellite image analysis, supplemented by visual observation, comparative analysis, and examination of data sets. Satellite imagery analysis, facilitated by a Geographic Information System, was chosen for its proficiency in spatially presenting the spatial structure and identifying buildings and other objects on a large-scale map. The research was bifurcated into two levels of analysis, specifically macro and comparative analysis.

Hwaseong Campus

Pyeongtaek Campus

Giheung Campus

Onyang Campus
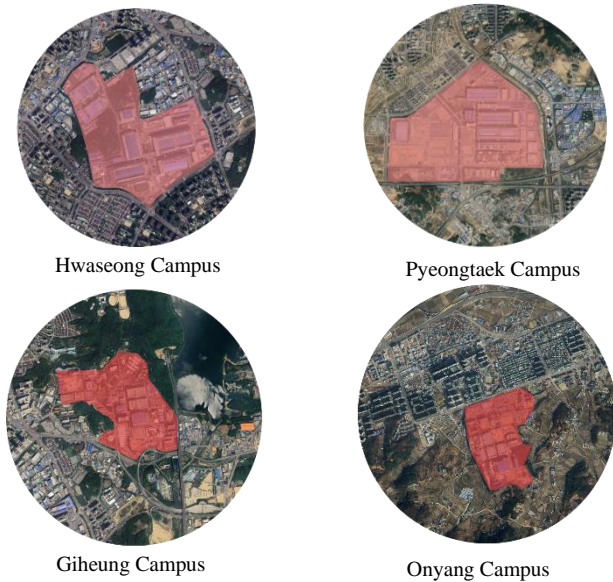
The macro analysis sought to provide an overview of land use and zoning change patterns. An area of 1.5 km² was chosen in the vicinity of the campuses to analyze these characteristics. Characteristics included the size of the campuses, commercial area (CA), industrial areas (IA), semi residential area (SRA) and exclusive residential area (ERA) in square meters.

This involved evaluating land area development changes before and after the construction of Samsung Campuses. The comparative analysis utilized changes in the Zoning system, utilizing satellite imagery from Google Maps and Naver Map. Data were extracted from satellite images in the years 2010, 2015, 2020 and 2023 respectively. Apartment complexes taller than 100 feet, which fall under the exclusive residential land use, were also analyzed as an evidence of residential development demand. Additionally, prominent brand stores such as GS-25, Seven11 and Starbucks were observed as indicators of urbanization. Figure 2 shows typical commercial, industrial, semi residential and exclusive residential area that are allowed according to zoning laws.
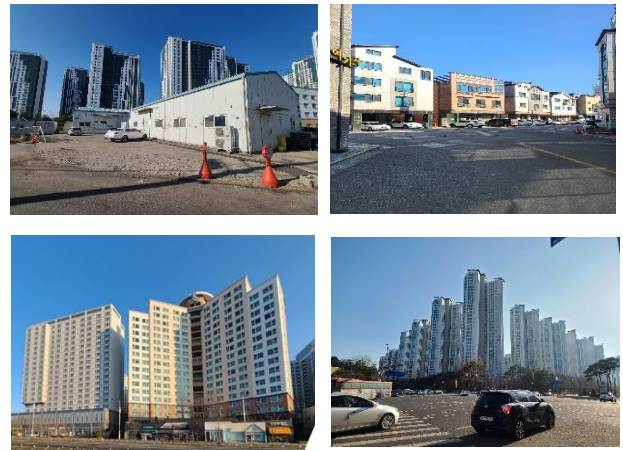

Figure 2- Typical Residential, Mixed, Commercial and Industrial Buildings

3. Results

The data taken at the Hwaseong campus is shown in figure. The common factor is the significant increase in apartment complexes after the completion of new assembly line. The most notable being the newly constructed plant in 2019 (shown as dotted line in the figure) which boosted the residential development. Around 69% of the area around the campus was covered by ERA. The semi-conductor dependent industry was 22% followed up SRA at 19.8%. Hwaseong and Giheung campuses are unique than other ones because they lie very close to each other, hance contributing collectively to the development of the surroundings. After the completion of the campus in 1992 which makes it the first semiconductor plant in the country, it attracted a lot of industrial growth around it. With the inception of Hwaseong campus nearby, the industrial growth doubled with IA covering an area of 14%. The campus also holds a massive lake nearby to fulfil the area's industrial needs. With the construction of a new assemble line, the ERA grew to more than 500% from just 8 apartment towers in 2010 to 45 towers in 2023.

The Pyeongtaek Campus is the biggest out of all, with 3.9 million sq.m. in size and employing 60k workers. The campus is one the recent built complexes experiencing a rapid growth with production lines constructed in 2017, 2020 and 2022 respectively and three

more are under construction. The campus was built next to an already existing industrial area of Modok-dong. Hence the industrial growth was analyzed to have remained the same. However, SRA and ERA were noted to grow exponentially. Since the area of the campus was chosen to be remote mainly because of its massive size, there were no SRA or CA before the construction of the campus. Within a span of couple of years, the SRA grew from being non-existent to 296k sq.m. The Onyang Campus is the farthest away from the capital city of Seoul. The campus itself is comparatively small with half a million sq.m. The growth remained slow comparing to other campuses with 55% area consisting of ERA and 35% of SRA. ERA doubled in the span of a decade while the CA grew steadily.
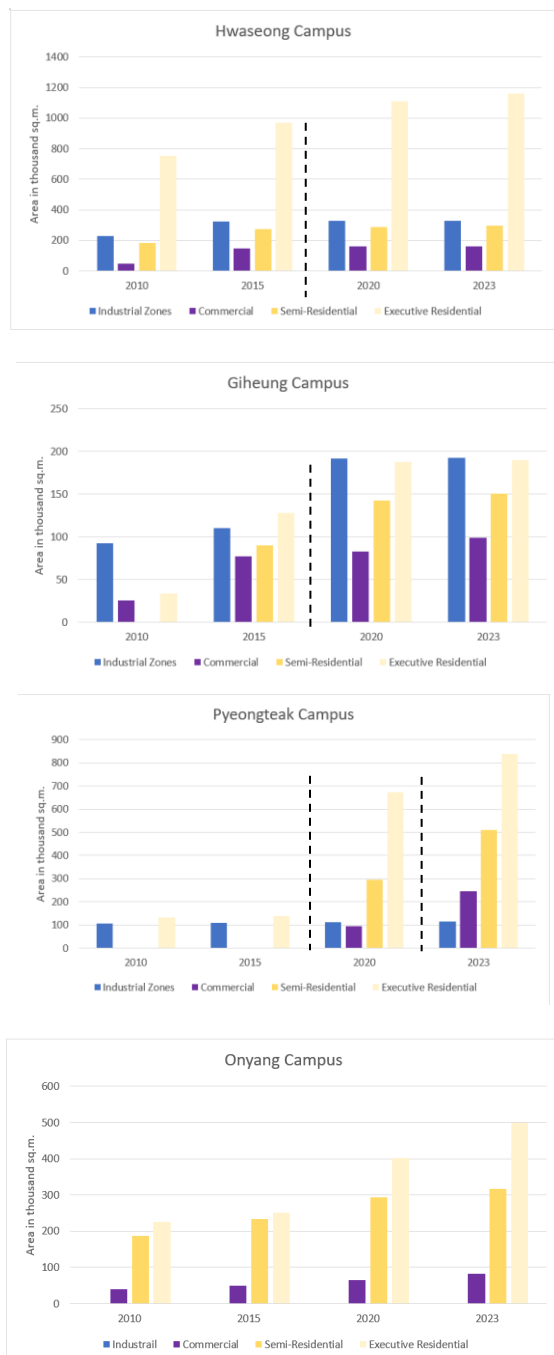
Despite undergoing rapid development in Pyeongtaek campus, figure 4 shows Hwaseong and Giheung campuses were the most populous and had the most apartment complexes because of their location. Both of these campuses sit at the edge of Suwon city, which is the capital of the Gyeonggi-do state and it closest to the capital city of the country.
Hwaseong Campus was noted to have the highest number of big brand Convenience stores with 18 GS-25 branches and 5 Starbucks in the vicinity. The common factor in all of the campuses was with the construction of a new assembly line, these branded stores also increased in numbers with GS-25 having the most stores. Pyeongtaek campus being a recent development was a farmland just 7 years ago, but now 20 convenience stores have already opened, which is in accordance with the population as 169 apartment towers are already constructed and numerous under construction. Since Onyang campus is located the farthest, growth of these commercial activities was slow but steady there. With the recently announced new construction line in the campus, the growth is expected to be doubled by the year 2025.
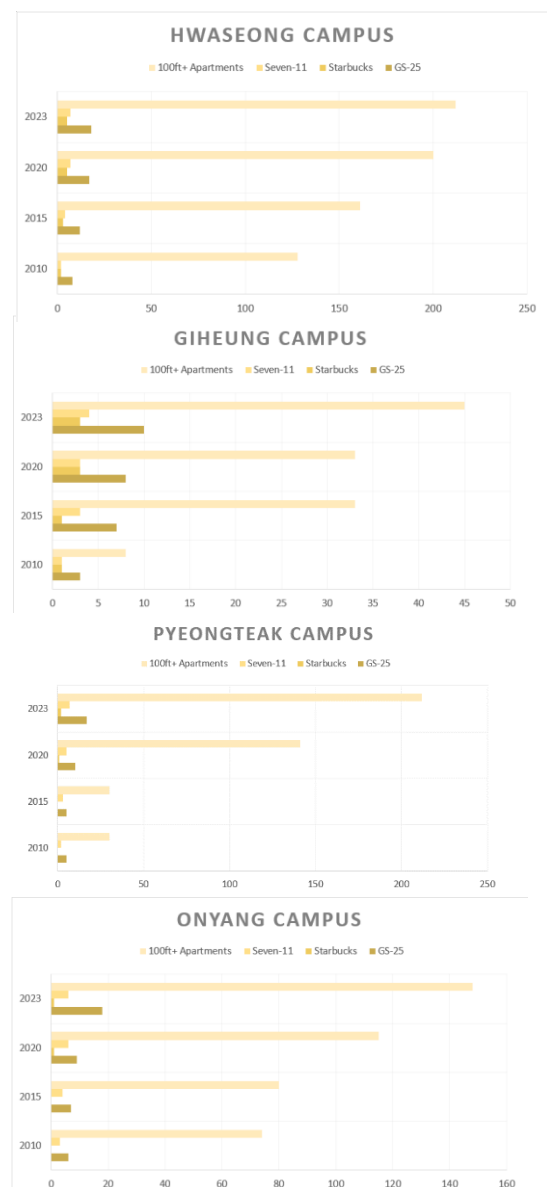

Figure 3- Zoning type analysis

Figure 4- Commercial brands growth analysis

4. Conclusion

In conclusion, the analysis of data from the Hwaseong campus reveals a distinct pattern of industrial and residential development, notably influenced by the completion of a new assembly line in 2019. The proximity of the Hwaseong and Giheung campuses has played a pivotal role in their collective contribution to the surrounding development. The Pyeongtaek Campus, being the largest in size, exhibits rapid growth with multiple production lines, while the Onyang Campus, located farther from Seoul, experiences a slower but steady expansion. Overall, the semiconductor industry's impact on these campuses is evident, shaping the surrounding areas and contributing to the growth of residential complexes and industrial zones. This comprehensive analysis provides valuable insights into the dynamic relationship between semiconductor plants and their impact on regional development.

The figures indicate that the Hwaseong and Giheung campuses stand out as the most populous, boasting a high number of apartment complexes. Their strategic location at the edge of Suwon city, the capital of Gyeonggi-do, and their proximity to the national capital contribute significantly to their demographic and infrastructural prominence. Notably, the Hwaseong Campus stands out for hosting the highest number of major brand convenience stores, including 18 GS-25 branches and 5 Starbucks outlets. A common trend observed across all campuses is the correlation between the construction of new assembly lines and the proliferation of branded stores. GS-25 emerges as the dominant convenience store brand across these campuses. Despite the Pyeongtaek campus being converted from farmland just seven years ago, it now boasts 20 convenience stores in line with its growing population, characterized by 169 apartment towers with numerous others under construction. On the other hand, the Onyang campus, situated at the furthest distance, experiences a slower but steady growth in commercial activities. The recent announcement of a new construction line there signals a prospective doubling of growth by the year 2025. This insightful analysis underscores the dynamic relationship between industrial development, population growth, and the flourishing of commercial enterprises across the diverse semiconductor campuses.

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