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Reinvigorating a Historical Commercial City Center Through Sustainability

- Rethinking Daerim sangga - Chyeonggye sangga -

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Abstract In the latter half of the 20th century, adjacent to one of the most famous sites in the Joseon dynasty named Jongmyo, Korea's first mixed-used development, Sewoon Sangga was erected at the heart of Seoul. This building, being the evidence of 50 years of socio-economic, cultural transitions, carries extraordinary historical and sentimental value. Ever since its completion, despite several redevelopment attempts it has faced many phases of dilapidation. This paper will analyze the impacts of the most recent developments of the Sewoon project on Daerim sangga-Chyeonggye sangga building. It will explore the causes of its deterioration throughout the years and suggest pragmatic solutions for revival through a redesign proposal. Additionally, in the redesign suggestion of the residential sections, the COVID-19 phenomenon will be crucially considered. This paper aims to suggest measures to transform the problematic existing building into a comprehensive mixed-use project through community development, community participation and sustainability.

Keywords: Mixed-use development, Dilapidation, Redevelopment, Sustainability, COVID-19

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1.Introduction

In the 1970s, the eight blocks of gigantic concrete buildings known as the Sewoon project, manifested the hopes and dreams of the war-stricken people in Korea. Constructed on the post-war dilapidated disproportionately linear piece of land in Seoul's heart, the goal was to create an economic-manufacturing center essential to reconstructing the impoverished nation's economy. The creator of Korea's first Mixed-use building, Architect Kim Swoo Geun, quoted as 'one of the most important leaders in Korean architecture', envisioned this project as encapsulating the concept of a whole city itself in a micro-scale in the form of blocks of mixed-use buildings, as an attempt to revive the exhausted economy of impoverished Korea. Failing to keep up with drastic social changes, this megastructure eventually fell victim to dilapidation. Ever since, to revive the Sewoon Project that carries the essence of Korea's dictatorship years, several measures have been undertaken. The very recent redevelopment measure in 2016, explored the possibility of revival through connecting all eight blocks of structures through a continuous pedestrian bridge extending from the Jongmyo Shrine on the North up to the Namsan Park on the South. Each measure of revival demonstrated distinctive drawbacks after a few years of operation. This paper will explore the socio-cultural and physical impacts of the 2016 redevelopment measure titled 'Sewoon redevelopment project,'on the Daerim sangga-Chyeonggye sangga building (the 2nd block from the North, of the series of four blocks, each consisting 2 buildings), investigate measures for its revitalization, suggest strategies for sustaining the proposed solutions and hint on future potentials of the project.

1.1 Research question

The Sewoon redevelopment project has been the target of research on national and international level for decades. Each implementation, brought about various challenges due to socio-cultural and spatial constraints. Analyzing the most recent approach of installing peripheral pedestrian bridges connecting the Daerim-Chyeonggye building with the Sewoon building, the decks provide uninterrupted vistas towards Jongmyo and Namsan and offers additional renting spaces that supplement the project from the financial and functional aspects, but the physical conditions beneath the bridges are contrasting to the upper levels. Moreover, the building's interior has not been considered in the redevelopment measure. Owing to political and construction complicacies, implementation of the original idea of connecting all 4 blocks through a

continuous pedestrian bridge is still under a lot of uncertainty. This paper establishes the basis that, instead of reliance on the uncertain future physical connectivity, the Daerim-Chyeonggye building demands to be considered as an individual entity at this point. On this ground, this paper will ask the following questions sequentially, 'What are the original reasons for the target building's dilapidation? 'What are the socio cultural and physical qualities of the mixed used project that need to be supplemented for it to sustain for a considerable period? 'and, 'what impacts the suggested approach can have on the existing surroundings?

1.2. Research goal

This research's primary goal is to seek an environmentally and socially compatible redesign approach with higher prospects to sustain amidst inevitable socio-cultural changes. In other words, the objective of this research is to analyze dweller-visitor comfort needs in figuring out sustainable, spatial and socio-cultural solutions in the revitalization process, from a micro scale to macro scale.

1.3. Research Methodology

Research methodology for this paper is divided into three phases- 'Literature review', 'Case study and site analysis' and, 'Design process & outcomes'. In the first phase, a comprehensive literature review supports the framing of concise research questions. The fundamental principles of keywords, i.e., Mixed-use development, Dilapidation, Redevelopment, Sustainability, COVID-19, are explained in phase 1. A thorough review of the relevance of the mentioned keywords in the project, and analysis of precedent research provides a useful framework for achieving this paper's goal. In the 2nd phase, case studies with similar crisis situations are analyzed to draw inferences and formulate suggestions that could be utilized in the target project's unique context. In the later section of phase 2, the target project is analyzed in light of history, socio environmental contexts and physical attributes. Finally, on phase 3, a comprehensive redesign approach (divided into commercial zone and residential zone) is presented.

2. Literature review

2.1. Mixed-use development?

'Urban Hub', an interactive platform for people working on the future of cities and mobility, simplified the definition of 'mixed use development' in their 2018 publication named 'Mixed-use buildings: make the most of your building' – "A mixed-use building aims to combine three or more uses into one structure such as residential, hotel, retail, parking, transportation, cultural, and entertainment. Whatever the combination, it brings together several uses within either one building or a small area. The two most common forms of mixed-use design are:

Vertical - a single, multi-story building, a typical mix places apartment on the upper levels and retail or offices at street level. A basement level provides parking and/or access to underground public transportation.

Horizontal - Spread over several buildings, such as a city block or around an open space or courtyard, these individual buildings serve one or two specific uses while creating a microcosm within a neighborhood."

2.2. Urban decay/dilapidation – in the case of Daerim-Chyeonggye sangga-

As quoted in the 'Designing Buildings Wiki', "Urban decay is a process in which a previously functioning city, or city area, falls into disrepair and disuse. Common indications of urban decay are abandoned buildings and empty plots, high unemployment levels, high crime rates, and an urban landscape that is generally decrepit and desolate" (Wikipedia, accessed 2021) The Sewoon mixed use project was initially planned as a microcosm representing a city itself, which faced major urban dilapidation in the span of 60 years. A large number of people abandoned the Sewoon project and moved to more convenient economic and residential developments, making it a potential illegal activity zone. Describing this phenomenon artist Seo Hyun Suk quoted, "Sewoon soon 'embraced the impossibility of what it had promised' (Mollard, 2018). For years Sewoon has been a passive victim of urban decay/urban dilapidation.

2.3. Review of precedent research

A 2008 study titled *'A critical investigation on the duality of the creation of urban space through restoration and development focused on critical review of the redevelopment plan of Sewoon District'* attempts to investigate the redevelopment plan of the Sewoon District in the modernism context of Seoul. Focusing on the international competition, (2004) for the redevelopment plan for the Sewoon District, it further sheds light on the new and transformed relationship between the 21st century city of Seoul, and architecture. Seoul Metropolitan Government's historical restoration agenda, seeking to mitigate the destructive instincts of modernism, called for a competition, inviting redesigning ideas. In this study, after a comparative critical analysis of the competition entries, the winning proposal of Fred Koetter, demonstrates attempts to continue tradition, rather than introducing something completely new. Instead of implementing structures as independent elements, Koetter's proposal (Reference Figure 1) establishes an organization, focused on the voids which are synchronized reflections of the surrounding spatial pattern. In his proposal, voids define forms instead of forms defining voids (Kim & Kang 2008). Moreover, as well as capturing the eternity of the past, respecting the history and tradition, voids represent uncertainty of the future, raising questions as to what kind of space or structure will occupy these left out chunks on the city terrain. This flexibility is further called as a



Figure 1. Koetter's proposal

crucial trait of a concept titled the 'third city', where freedom of interpretation is the guideline to overcome the influence of paradoxical urbanism in modern cities.

To summarize, this proposal analyzes the character of the specific city context on a larger scale, where spatial interpretation is the focus, and represents a model for materializing a 'future flexible city' in Asia, but what it lacks is the need to address contextual problems on a micro-scale. The voids/green strip proposed as a public hub, generated among the 4 clusters, surely is of relevance in terms of regeneration, but it further raises the question if demolishing the original buildings and framing the void plots with synchronized forms, identifying with their surroundings is genuinely the sole solution to regeneration.

The next significant proposal, 'Seoul Redevelopment promotional plan' (2009) took shape after 10 meetings of project councils and 16 consultations with urban redevelopment committees. Professor Haesong Jae in his study *'Sewoon District Revitalization: A large scale urban centre redevelopment project in Seoul to cope with Environmental, cultural and Tourism issues'* discusses the design concept and planning extensively. The planning divides the entire zone in 5 main districts around the concept of recognizing the structure of urban centre's space, greens, city, and harmony with tradition.

Each zone had a designated theme – a High-Tech zone, international sense of excitement zone (adjacent to Chyeonggyecheon), amenity, residential zone, culture service zone, community zone for regional residents, well-off lifestyle street (Jae, 2009). Again, in this proposal, the main buildings are demolished where the vacant site is introduced as a green belt generating an axis, visually and physically connecting the historical zones. The question remains, does demolition of the original buildings have to be the starting point of each proposal relating to the Sewoon site?

After a series of discussions with the planning teams and inhabitants, the first building adjacent to Jongmyo was demolished. But after the demolition, the residents, recognizing the modern building's value and its relationship with the neighboring area, opposed further demolition. This realization was driven by the fact that, despite possessing contrasting characteristics, over time Sewoon complex has tuned itself into the existing urban fabric, which is evident in its spontaneous adaptation to the local context. Finally, the Seoul Metropolitan Government decided to preserve the rest of Sewoon complex and changed plans from redevelopment to regeneration in 2013 (Kim & Meulder, 2017). In this proposal the already demolished building site was introduced as a 'city green park'. Overlooking the Jongmyo Shrine on the North, this large-scale public space provides facilities for cultural activities and street exhibitions, and acts as a platform to appreciate the vista towards the shrine.

Right after this phase, in 2015, the Seoul city government made an open call for a competition to Re-Structure Seoul's Sewoonsangga Citywalk. (Reference Figure 2) The winning "Modern Vernacular" concept design by Environ-

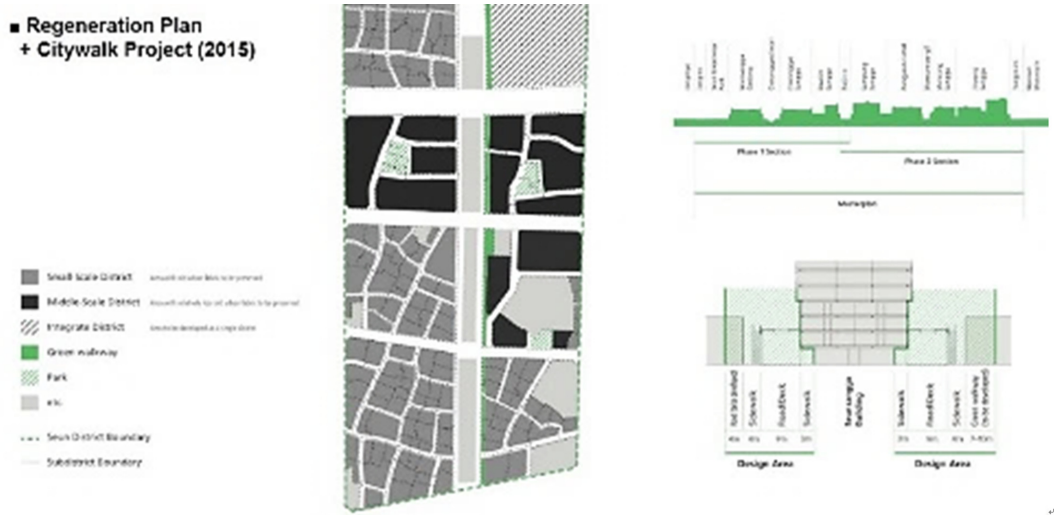


Figure 2. Citywalk project 2015. (Extracted from the Seoul City Homepage. Citywalk information, edited and created)

mental Scape Architects was finalized in December 2015. The design was to be built in two sections, with the first stage scheduled to be completed in May 2017. The implementation of the first phase of the proposal is what we witness at Sewoon sangga today - the pedestrian bridges that connect the two structures over Chyeonggyecheon stream and house supplementary functions as well as open air public decks on the 3rd floor.

Among the developments of this proposal, the creative hub known as the 'maker's cube' at the Sewoon building has worked substantially well by continuing the tradition of the 'makers' culture. A production workshop is run by 'Fab Lab Seoul', The university of Seoul has also opened a practical work experience campus. Due to the existing industrial infrastructure, combative rents, and favorable location, Sewoon is attracting more tenants. Startups are joining the existing material, electrical, printing and lighting businesses.

Of the recent researches and design studies conducted on the Sewoon mixed used project, the ones considering urban regeneration are sorted out and the analysis is presented in the Table 1 chart below.

From the analysis, it is evident that, in most studies, Sewoon arcade is the target building and none of the studies focus on the residential component. Studies where Daerim Sangga is brought to the scheme, it is considered in the projection of the eight buildings being connected together by a continuous pedestrian deck, owing to political, technical and budgetary issues completion of which is under great uncertainety till today. Therefore, this brings to the decision to consider the Daerim Chyeonggye building as a target site and figure out it's potentials to be redesigned as an individual sustainable building which will impact its surroundings positively. In one study, an

Table 1. Recent research on Sewoon project focused on revitalization solutions

research title	author	prominent target building	prominent component addressed	Consideration of energy efficiency/green design
Restructuring Sewoon sangga city walk-open platform (2017)	Park,yeol	Sampoon – PJ hotel and Inhyn(Shinseong)-Jinyang sangga	Commercial section	yes
A study on the spatial changes and decline of urban regeneration area – in case of Seoul Sewoon plaza (2018)	Woo, sujin Lee,sang yun	Sewoon sangga	Commercial section	no
A locus where city meets nature (2020)	Im pyo-hong	Sewoon and Daerim sangga	Commercial section	yes
A study on urban revitalization characteristics of Sewoon arcade for urban revitalization (2020)	Lee, Ja young Zhu, Xueying Hwang, Yeon-sook	Sewoon sangga	Commercial section	no

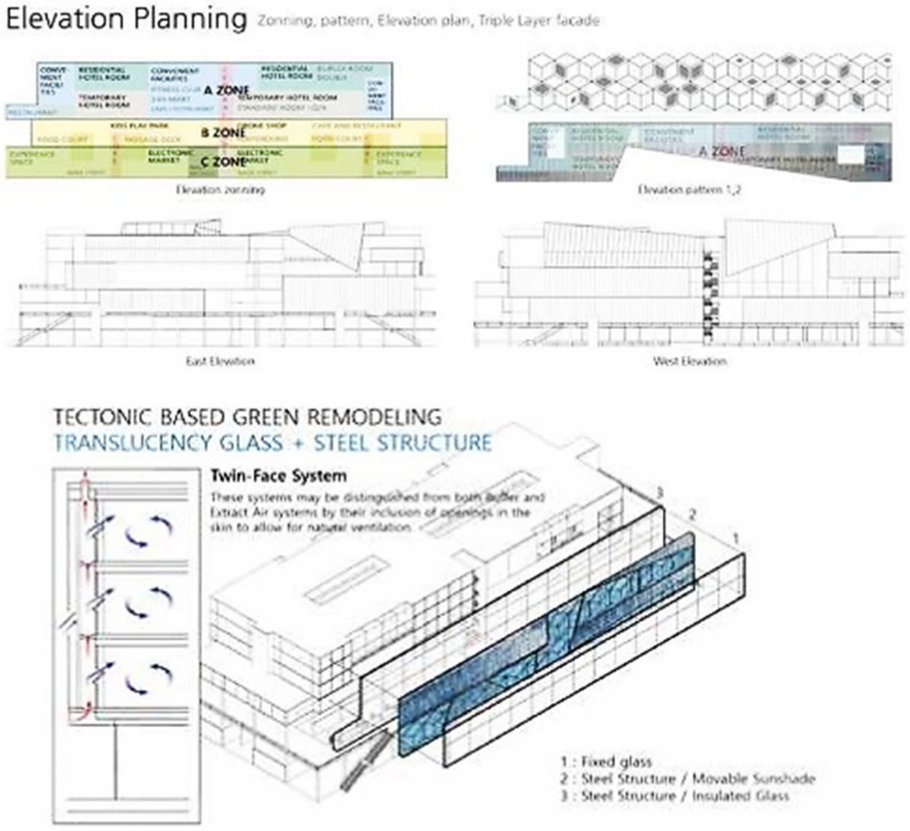


Figure 3. Kinetic façade planning.

energy efficient reconstruction proposal for Sewoon sannga and Daerim sangga is presented but it too is focused on the commercial sections of the building.

A 2017 study on Sewoon sangga titled *'A study on remodeling planning by utilizing BIM based kinetic elevation'* explores the energy efficiency potential of kinetic facades and its ability to add to the aesthetics and performance of a remodeled building. In the study of the author and Professor Lee Jae Won discuss the vital role of 'intelligent exterior' as an integral element of 'intelligent building'. The study shows, smart facades, that can respond to the changing environment and adjust themselves according to these changes, not only affect the building interior but they also affect the adjacent environment, so BIM based study on the kinetic skin can go a long way to measure and further make adjustments to improve the performance and overall efficiency in energy saving when it comes to remodeling and creating Zero Energy Buildings. The study draws attention to the fact that energy need calculation becomes complicated in residential type buildings as dwellers of each unit may differ in their own customized indoor environment (thermal, ventilation, lighting) preferences. (Reference Figure 3)

This paper further proposes a remodeling scheme for the Sewoon Sangga building introducing semi residential hotel on the upper floors. An elevational study is then conducted that utilizes a climatic control system that can manage energy efficiently with less environmental impact. The triple layer façade is then analyzed in BIM based 3D environment and the results are presented (Lee & Lee, 2017).

It is to be mentioned that, this redesign study focused on the Sewoon Building. Drawing inference from the energy efficiency outputs of this study it can be established that, more extensive study on the Chyeonggye-Daerim building, needs to be conducted in light of energy efficient performance, utilizing spatial and façade design strategies. Finally, a comparative analysis of the related precedent studies' contents and keywords are conducted to suggest keywords for the research. (Reference Table 2)

Table 2. Precedent research keyword comparison

Precedent Research title	Authors	Keywords
'A critical investigation on the duality of the creation of urban space through restoration and development focused on critical review of the redevelopment plan of Sewoon District'	Kim, Ji-hyun Kang, Wook	Seoul urban renewal, Sewoon district redevelopment, International competition, Paradoxical urbanism , Historical restoration
'Sewoon District Revitalization: A large scale urban centre redevelopment project in Seoul to cope with Environmental, cultural and Tourism issues'	Je, Haeseong	Sewoon district, Urban Revitalization, Redevelopment
A Study on Sewoon District Remodeling Planning by Utilizing BIM Based Kinetic Façade	Lee, Myung Sik	Kinetic façade, Remodeling, Energy, BIM
A study on urban revitalization characteristics of Sewoon arcade for urban revitalization (2020)	Lee, Ja young Zhu, Xueying Hwang, Yeon- seok	Urban regeneration, Sewoon Arcade, Urban revitalization area, Creative industries, Industrial economy
A study on the spatial changes and decline of urban regeneration area – in case of Seoul Sewoon plaza	Woo, Sujin Lee, Sang Yun	Urban Regeneration, Spatial Changes, cause of decline
Suggested Research title	**Authors**	**Suggested Keywords**
Reinvigorating a historical commercial city centre through sustainability Rethinking Daerim sangga - Chyeonggye sangga	Muniat, Jeba Fowziyah, Lee, Myung Sik	Mixed-use development, Dilapidation, Redevelopment, Sustainability, COVID-19

2.4 'Sustainability' & strategies for sustainability:

'Sustainability' is a word often confused with 'environmental sustainability'. But 'environmental sustainability' is only a type among a broad spectrum of sustainability. Dr. Paola Sassi, in her book 'Strategies of Sustainability' has demonstrated 6 categories of sustainability strategy – 1. Site and land use, 2. Community, 3. Health and well-being, 4.Materials, 5. Energy, and 6. Water. "Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Sassi, 2006)– she quotes in the opening chapter.

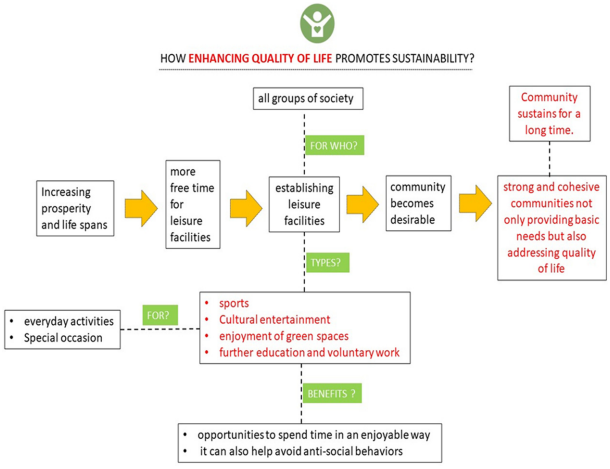
In this paper, in the remodeling proposal, strategy 2 will be explored in terms of achieving sustainability through improving quality of life. From Dr. Paola Sassi's description, the following Table 3 diagram is developed to understand the process of achieving sustainability through improving quality of life-

Furthermore, in this paper, strategy 3(health and well-being) & strategy 5(energy) will be explored in the redesign proposal, in the context of 'post covid-19 society'.

2.5. 'Redesign'/ 'Remodeling' replacing 'Demolition & Reconstruction':

Achieving minimal carbon emission in architectural process is one of the contemporary concepts. Humanity's resource consumption exceeding the planet's yearly renewal capacity in the early 1970's shed light upon the impact of the construction industry in the carbon emission phenomenon. "materials and construction products cause carbon dioxide

Table 3. How enhancing the quality of life promotes 'sustainability'



emissions in activities such as mining, transportation, factories and combining chemical products" Souza (2019), stated Architect and Urbanist Eduardo Souza in the article 'How Can We Reduce Carbon Emissions in Architectural Projects?' The potential of reduction of carbon footprint, from the earliest phase of planning to the construction period, and during project operation, has become a critical issue in the construction industry. Architects in the planning process have the ability to minimize carbon emissions. So, it leaves no doubt that, remodeling is far more efficient than demolition.

2.6. Energy efficient/green remodeling and its relevance with 'Post corona society' -

Since January 2020, COVID 19 pandemic has transformed lifestyle patterns, drastically impacting all aspects of human lives. As the time people spend indoors have increased worldwide, well litted, properly ventilated, and thermally comfortable indoor environment has become a prerequisite to prevent Covid and other respiratory diseases. According to 'Korea land and housing corporation green remodeling creation center', currently 75% of the buildings in South Korea are performance deteriorated old buildings, contributing to the greenhouse gas (32.7%) emitted by building sector nationwide (whereas transportation sector emits 29.3% of the total emission nationwide). Government is considering making 'zero energy building approach' compulsory in new constructions as well as pushing forward with the green remodeling approach for old buildings for both energy efficiency and health safety. The target is to reduce 37% emission by 2030(in compliance with 'Korea Paris climate agreement').

The government is also planning to invest approximately 200 trillion dollars in the 3rd supplementary budget announcement on this sector. It is estimated that green remodeling of 1000 buildings will reduce 60,000-ton greenhouse gas emission, induce 5000 employment positions and also induce production of 680 trillion dollars (approximately). It is evident that the increased number of old buildings and the invasion of corona has prioritized the need for energy efficient remodeling, that will not only ensure health safety, but will also support the country economically and protect the world climate in broader terms.

The spread of the virus is by physical contact with it by an infected person or contaminated surfaces. The virus has shown material-specific lifespans, Copper and Aluminum being the lowest in the chart where the virus survives from 4 hours to up to 12 hours as opposed to woods and cardboards where the virus may survive from 36 hours to up to several days. In the case of family housing, minimizing surfaces is not a feasible option as surfaces are the elements for creating privacy. Therefore, it is a matter of research as to how the virus can be obstructed from penetrating the indoors through spatial organizations.

3.Case study & site analysis

3.1 Case A- Remodeling aiming at preservation of regional and historical sentiments, Project name - De Karel Doorman, Rotterdam:

De Karel Doorman consists of the renovation of a shopping building: Ter Meulen and an added residential building on top the existing mall. This is an unusual project as the new building rests on the columns and foundations of the existing structure where a pair of concrete lift shafts are the only additions for structural stability. (Reference Figure 4)

Historically, the Ter Meulen building has a special place in the hearts of the people of Rotterdam. It was initially constructed as a shopping center in 1948, designed by Van den Broek and Bakema. With its extensive glazed facades, the building stood out in comparison with its contemporaries. The concept was "See and buy". In the latter half of 20th century, the building was partly demolished and redeveloped, including the addition of two shopping floors. Ibelings van Tilburg architecten proposed restoration and redesign in place of demolition



Figure 4. Redevelopment phases of De Karel.

and reconstruction, keeping in mind its historical and sentimental values and future potential.

While redesigning it appeared that the loadbearing capacity of the structure was more than what was needed in the original design, where a portal system with columns and beams gave stability to the original structure. In the new design, two new concrete stabilizing cores were added, providing stability to the upper floors and linking the old and new structures together. 16 new floors were added that consisted of a printed glazed external skin creating a shell.

The 2nd-floor parking lot created a transfer floor providing efficient parking both for the retail and the residences. The apartment block divided into two masses had 6 and 9 floors respectively. In the split section of the building, a roof garden had been installed for flourishing a sense of community.

This studies relevance with the Derim Chyeonggye Sangga project is, its remodeling process focused on historical value and regional sentiments attached to a site. Also, remodeling was chosen as a feasible approach to save up resources and minimize negative environmental impacts. In the planning of the apartment units', ventilation and thermal comfort had been given highest priority, which are useful factors to be analysed in the target case of this paper. Though the cardinal disposition may vary, with the De Carel's width being positioned along the East and West, as opposed to Daerim Chyeonggye building being placed along the East-West with its length, the inferences drawn from the results of this case study can provide a guideline in handling elements and spaces that responds to the corresponding site, in order to fulfill one of the aims of this paper that is to suggest solutions to a comfortable residential environment all the year round.

Case B- Remodeling aiming at improving quality of life (sustainability strategy) to sustain community- Project - Robin Hood Chase Centre, St Ann's Nottingham, UK:

The renovation of Robin Hood Chase Centre is an excellent example of regeneration through improving quality of life by community participation. At the initial phase, the locals opposed demolition and it was decided to keep the existing facilities (a post office, chemist and health center) and build additional facilities like meeting rooms, a community hall, a café and toilets. What stood out was the policy of inclusion in the renovation process. The construction process introduced local materials and a training program to include local unemployed people. This process not only induced a deep sentiment for the project within the locals, but also assisted in creating jobs for them. After the completion of the renovation, crime rate minimized in the highly deprived area, contributing to improving quality of life.

Analyzing the annual crime rate data of 'Korean Statistical Information Service' (1994-2020, data updated at 2020.12.18) at Jung-gu (the district where Chyeonggye-Daerim sangga is located) and at the immediate surrounding districts, the following chart is prepared-

Table 4. Crime rate data comparison of Jung-gu and surrounding districts

District	Population	Crime occurrence number
Jongno-gu	151,290	12,132 (.08%)
Seongbuk-gu	442,650	9,444 (.02%)
Dongdaemun-gu	346,194	11,510 (.03%)
Seongdong-gu	300,889	8,846 (.02%)
Jung-gu	**126,171**	**13,706 (.10%)**
Yongsan-gu	228,670	10,500 (.04%)
Mapo-gu	374,035	14,814 (.03%)
Seodaemun-gu	309,397	8,714 (.02%)



From the comparison chart it is evident that Jung-gu has the highest rate of crime occurrences per person compared to its surrounding districts. The Sewoon district also has a notorious history of piracy and flourishment of illegal business owing to the rigid spatial quality and lack of transparency of the building blocks. Analyzing the situations and outcomes of the community driven case study above, it can be said that through strategic redesign approaches, the target building Daerim-Chyeonggye sangga has the potential to contribute in improving the quality of life of the local community by decreasing the crime rate in the district.

Case C - Remodeling aiming at improving indoor environment in post covid society -Project name: Seoul Gongneung Public Health Centre:

A public health centre in Gongneung, Seoul, constructed in 1980, was renovated through green remodeling in 2020. (Reference Figure 5) The exterior skin was reconstructed, and BEMS (Building Energy Management System) to monitor and analyze various information of energy system in the building in real time, was installed. First, the exterior walls were demolished and an airtight, well insulated exterior skin was introduced with high energy efficient windows that increased the natural light intake and decreased heat loss from the indoors. On top of that,





Figure 5. Elevations of Gongneung health centre before and after remodeling.

high efficiency heating/cooling system decreased energy consumption requirements. A forced ventilation system discarded polluted indoor air and brought filtered air to the indoors. Additionally, solar panel on the rooftop produced renewable energy, cutting down consumption from the city grid. The result was a healthy and comfortable indoor environment, well ventilated with fresh air which is ideal to the post corona situation, and energy consumption was also reduced by 86% of the old building.

3.2 History and socio-environmental characteristics of Sewoon mixed use development:

In the 1960s, during the post-Korean War period, downtown Seoul was at the center of rapid economic growth and urbanization. The peninsula with its inadequate natural resources, resorted to utilizing technology focused on reproduction and improving imports as a means of development. As a part of the government's ambitious development regimes, Sewoon district was constructed as the first mixed-use building and the most extensive electricity shops and apartments in Korea. Designed by the most famous Korean Architect at that time, Kim Swoo Geun, Sewoon, Daerim, Jinyang, Sinseong – these four building blocks comprise the entire Sewoon mixed-use project.

To understand the context of Sewoon mixed use project, it is essential to understand the socio economic and environmental consequences of the Chyeonggyechon Euljiro area and how it was formed and modified over a period of 60 years.The post war (World War II) revitalization scheme of the then government, focused on technical knowledge, gave birth to large organizations (such as Panasonic and Hyundai). Simultaneously small-scale manufacturers known as 'makers' flourished. Concentrated in the Chyeonggyechon Uljiro area, the specialty of these businesses was the ecosystem formed by clustering of activities in the process of production (metal work, clothing, electronics, woodwork and so on). The road covering Cheonggyecheon was the main urban transportation route. The larger companies (chaebols) placed their production centres at the periphery of the city. On the contrary, the smaller makers remained closer to the city centre for the benefits of better accessibility to markets, clients and housing. In the past, the downtown had been the center of facilities (residence, work, production, etc.) leading the urban economic development by generating new jobs and flourishing creative activities. In the course of urbanization in the later years, it became a central business district focused more on production and businesses.

From the 1980s to 2000s, Seoul's old industrial districts, including the Sewoon building blocks, faced significant urban dilapidation. One reason is, due to rapid industrial growth, production of electronics, sound equipment, and computer parts that were the specialty of engineers and merchants in this area, started being assembled through mass production. Advent of e-commerce and multinational manufacturing companies decreased the feasibility of Sewoon's small-scale businesses. As Seoul's economic structure changed, a transformation in this area was prerequisite to its survival but it was not implemented for the following restraints –

1. The downtown being composed of small plots and congested narrow road networks, could not possibly accommodate new industries,
2. Land prices were on the peak,
3. Worn out landscape and the quality of life deteriorating as a consequence of it.

As people and businesses left the downtown area, the urban structure transformed. Residential area moved to the suburbs or other areas such as Gangnam offering better living conditions and opportunity, while electronic shops transferred to Yongsan. Multi-centralization and competition among different land uses challenged the existing physical and socio-economic structure of the Sewoon district. In spite of this complex situation, the small-scale manufacturing area surrounding Sewoon remained undisturbed. As a result, this area remained the center of urban industry in downtown Seoul.

What makes this area distinct is the urban manufacturing network that is unique to this district. Over the years, the residents and businesses denied high density development plans of the government and private sectors in fear of gentrification. Due to the nature of the relationships between the makers in the area, the merchants and business personnel see that they will not survive if they relocated their business. Collecting the Industrial data of Jung-gu area (Seoul metropolitan governments 'Seoul statistics service', 2019), the following chart is prepared –

From the comparative analysis in the Table 5 chart above, it is seen that Euljirodong has the highest number of manufacturing businesses (3545 in total) which is

Table 5. Density of manufacturing business in a total 15 districts of Jung-gu

District	Number of manufacturing businesses	Number of workers
Seogongdong	81	224
Hwehyeondong	203	735
Myongdong	280	1023
Pildong	1033	4470
Jangchungdong	98	514
Gwanghaedong	2444	7068
Euljirodong	**3545**	**8974**
Sindang5 dong	275	1123
Hwanghagdong	197	462
Junglimdong	64	220
Sindangdong	556	1902
Dasandong	162	586
Yaksudong	39	127
Chonggudong	125	648
Donghwadong	267	1326

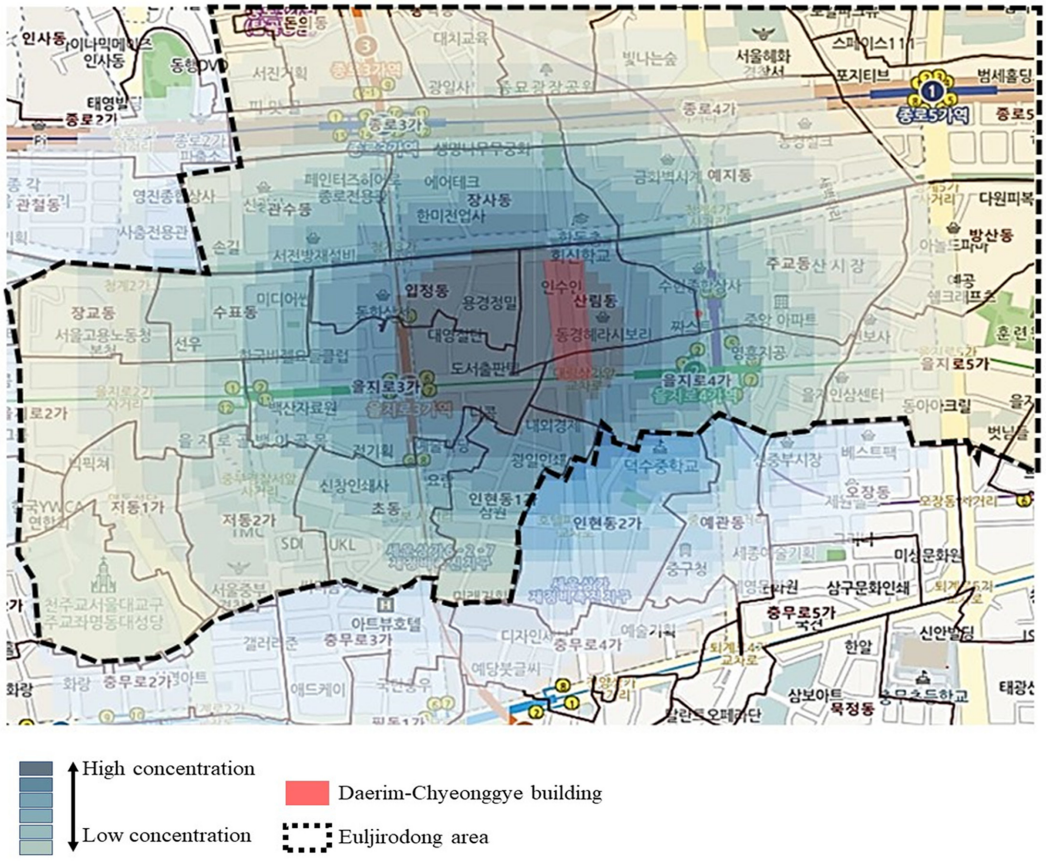


Figure 6. Concentration of metal manufacturing industry in the vicinity of Daerim-Chyeonggye sangga.

almost one third of the total manufacturing businesses in junggu district (9369 in total). Further, from the following map diagram the concentration of metal manufacturing industry in Euljirodong (Seoul metropolitan governments 'Seoul statistics service'2016) can be analyzed. (Reference Figure 6)

From the above data it is observed that, the immediate vicinity of the Daerim-Chyeonggye building in the Euljiro area demonstrates the highest density of primary metal manufacturing industry. In the remodeling process, these manufacturing industries can be utilized for supply of metal materials such as structural and façade frames. Analyzing the results of a 2018 survey on the number of old buildings in Seoul, conducted in an article in the economy news portal 'Maeil Ghyonngjae' (Park soo ho, Kang seung tae. 2018) and comparing it to the total land area of the districts the following chart is prepared- (Table 6)

It is observed that Jung-gu has the highest percentage of old buildings per unit land area. Supporting the existing metal industry, the goal is to present the remodeling process as an ideal example of involving the community and existing manufacturing industry in the construction process, and stimulate a new manufacturing industry of environment friendly building materials while creating more scope of work in the area. (Reference Table 6) Aside

Table 6. Comparison of the number of old buildings in Jung-gu & the districts surrounding Jung-gu

District	Number of old buildings	Land area	Percentage of old Building per unit area
Jongno-gu	2,187	1,60520	(.013%)
Seongbuk-gu	5,031	4,52290	(.011%)
Dongdaemun-gu	4,039	3,60380	(.011%)
Seongdong-gu	2,220	3,04851	(.007%)
Jung-gu	**2,079**	**1,36030**	**(.015%)**
Yongsan-gu	2,947	2,45362	(.012%)
Mapo-gu	1,610	3,84957	(.004%)
Seodaemun-gu	2,061	3,24224	(.006%)



from the land problem, another threat is young people opting for better paid jobs, denying to take up the trade of their parents. This phenomenon is resulting into the older generations inability to pass on their business and knowledge. Creating an inclusive industry with the integration of contemporary knowledge with the existing metal manufacturing industry (focused on sustainable material production) has the potential of making the young people interested in investing in the age-old trade.

It is without question that Sewoon's strength is its small-scale makers, unique in flexibility, and variety. If they are wiped out, a whole generation of technological knowledge and manufacturing culture will be erased. Replacing is not an option. Instead, how the flexible

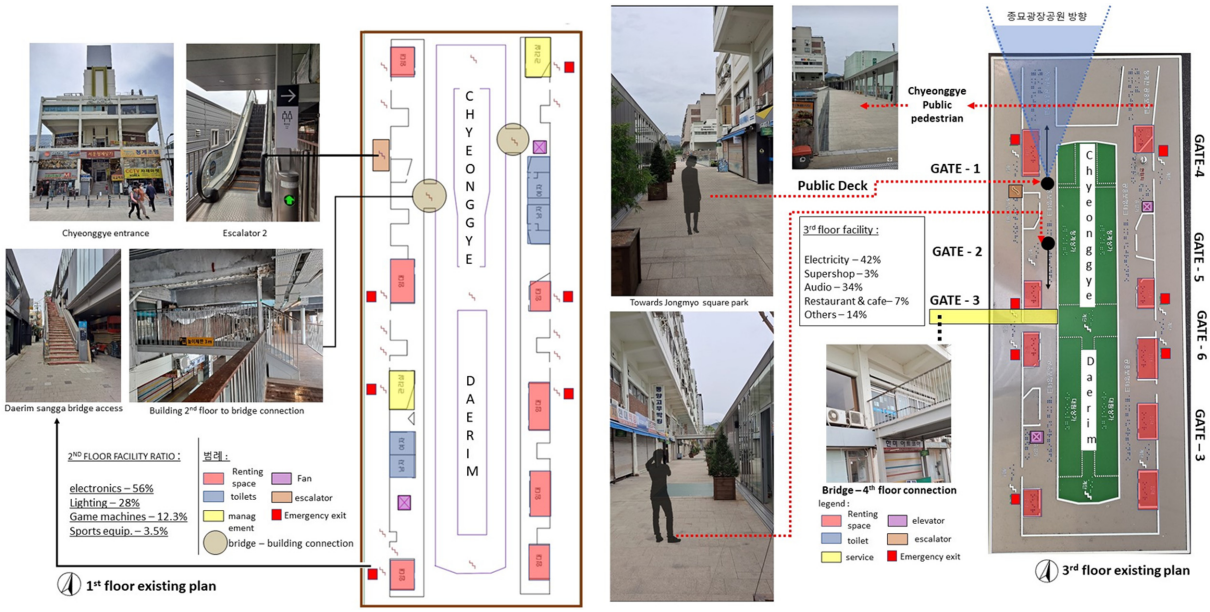


Figure 7. Present physical conditions of the site.

manufacturing network may be utilized to burgeon new startups and how the existing knowledge may be integrated into the contemporary technological advancement to add value to the old knowledge and suggest new possibilities is a crucial factor that is considered in formulating the redevelopment scheme for this project.

3.3. Present physical conditions of the target building and problem identification:

In the 2016 'Dashi (again) Sewoon project' development, two parallel bridges connecting the Chyeonggye sangga with the Sewoon Sangga, over the Chyeonggye stream was introduced. In addition to the 3rd-floor bridges, peripheral structures accommodating toilets and office spaces, were erected with lightweight materials on the 2nd and 3rd floors.

The 3rd floor public decks offer a pleasant pedestrian environment providing wide-open view towards the Jongmyo shrine and Namsan. On the contrary, analyzing the old building's relationship and response with the additional structure, a number of disadvantages are marked. (Reference Figure 7)

1. Despite being built with lightweight materials, the vast scale of the bridge obstructs sunlight and air circulation on the 1st and 2nd floor levels.
2. The peripheral functions block view on the east and west wings of the building. Although there is nothing significant view wise on these two directions, for feasibility and security, a certain degree of transparency is needed.
3. Surface parking disconnects the building from its surroundings, creates confusion of circulation.

The interior of the building demonstrates the following problems- –

1. It lacks clarity of functions, making navigation difficult.
2. Lack of storage space, resulted in goods kept on the nooks of alleyways and on the pedestrian walkways.
3. The double loaded corridors are not sufficiently wide for smooth pedestrian movements.

Lastly, analyzing the upper floors (from 5th floor onwards), initially planned as residences the following problems were identified –

1. Segregation of the residential-commercial circulation, prerequisite to privacy, was absent,
2. Despite the attempt of bringing in skylight into the long double-loaded corridors through roof slits, the environment of the circulation space is rather dark,
3. The units being arranged on the east and west did not offer sufficient thermal comfort for the residences.

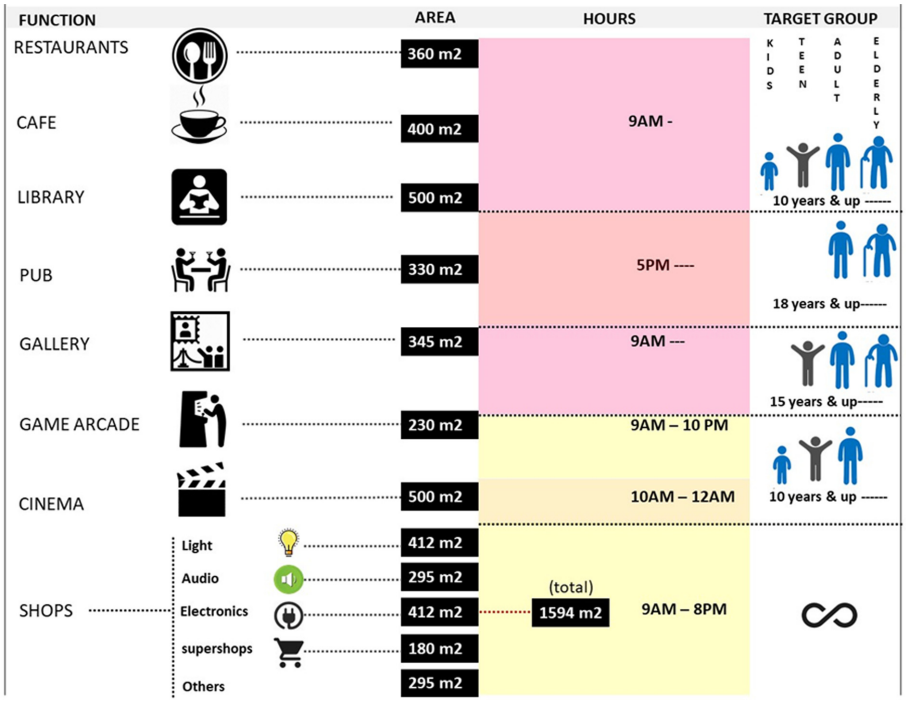
In this paper, the redesign will aim at solving the existing physical problems of the project as well as expanding onto more futuristic solutions, especially in the context of COVID 19 era.

4. Design process & outcomes

4.1. Commercial block design program

As a response to the spatial and functional drawbacks of the commercial block (from basement 1st floor up to 4th floor) of the Dareim Chyeonggye building discussed in the previous section, a comprehensive program needed to be developed targeted at a diverse range of age and income groups. In accordance with that the program for the commercial floors were rearranged with a more practical ratio with additional programs such as gallery space, cinema, souvenir shops, restaurants, cafes, game arcades and a pub. Keeping in mind the target groups and

Table 7. Program for commercial block (1st-4th floor)



timetable of each facility functioning, variation in program was created to keep the place active even at late hours of the night.

4.2. Commercial block redesign measures:

The surface parking was replaced by basement parking, where around three times more parking units could be provided, including parking for service vehicles. The basement level floor was expanded, adding an extra aisle of column to both eastern and western wings for a smoother parking experience.

In terms of structural transformations, the existing cores were demolished and 5 new cores were introduced- a central core which allows public access to the central public green roof, each of the building blocks (Daerim on the South and Chyeonggye on the North) having one core designated to residential access and one for public access across the commercial floors. Moreover, the Southern wing accommodated a cinema hall, which demanded the demolition of the central rows of columns for wider clear space and the addition of thicker columns on the periphery to reinforce the effect of the structure exclusion. Aside from

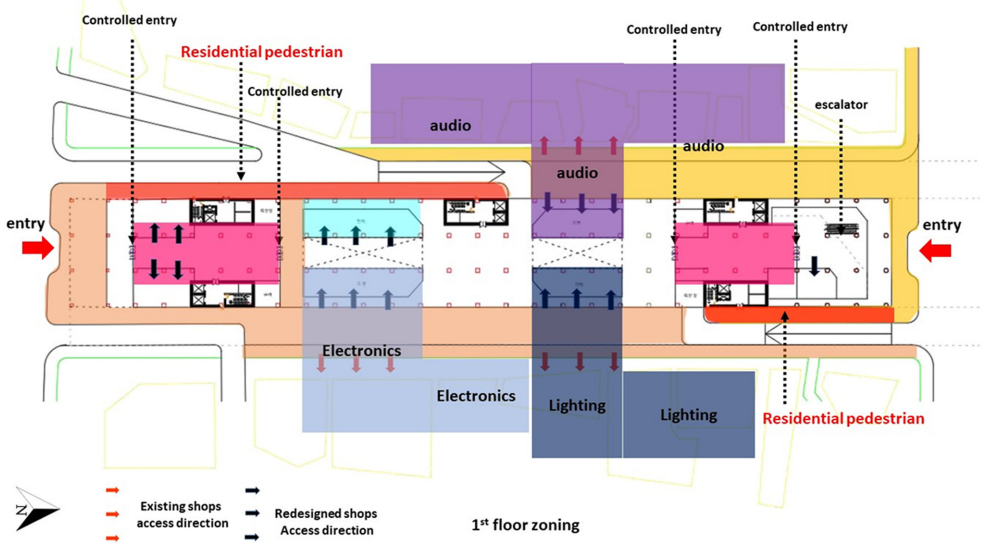


Figure 8. A projection of commercial facilities expanding in 5 years.

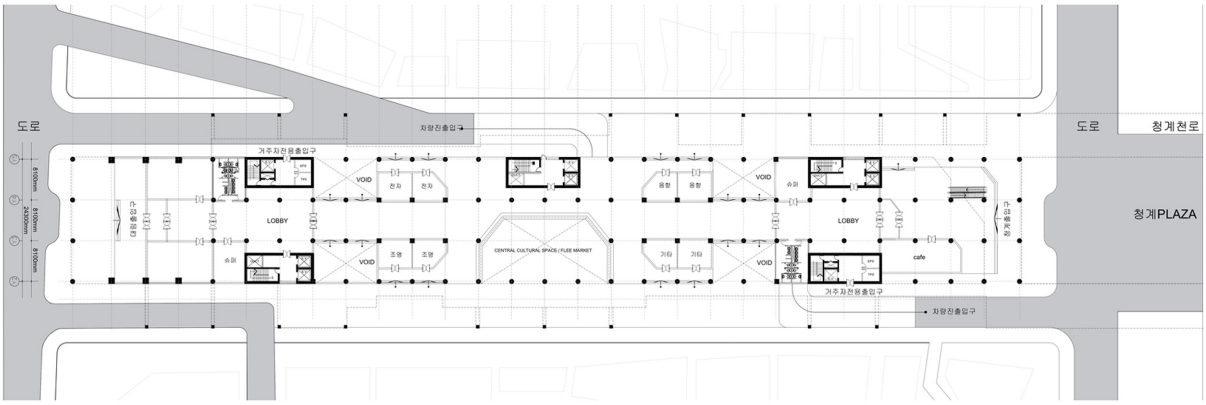


Figure 9. Ground floor plan.

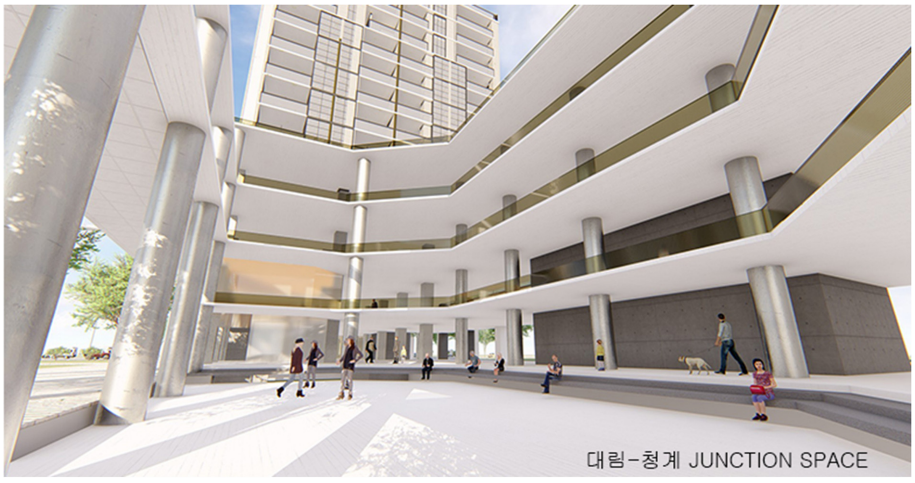


Figure 10. 3D view of central cultural space.

that, the existing structure and column grid was kept intact for cutting cost and reducing carbon emission.

The central concept of the commercial floor redesign was to revive floor to floor interaction, building to bridge interaction and, building to surrounding interaction. The existing traffic circulation was transformed to introduce broad, uninterrupted, ground level pedestrians for interaction between commercial spaces on both sides of the street. In sync with the direction of opening with the roadside commercial spaces, the commercial spaces on the ground floor had openings facing the street side, further stimulating activities in the newly proposed pedestrian.

The parts of the pedestrians that were narrowed down by interruption of traffic ways were utilized as less prominent, secured pedestrians for accessing the residential cores, ensuring sufficient privacy and segregation from the crowd. Moreover, as stated in the earlier sections, the bridges accountable for the adverse environment under them, were subtracted in parts and only what was needed for circulation in addition to extended terraces were kept to function as outdoor spaces for cafes and as community interaction spaces.

Voids were introduced to achieve visual connectivity, transparency of circulation and natural lighting & ventilation. The most prominent void was the 4 floors deep void right at the junction of the two buildings. This portion of the building was a crucial conceptual space that was thought as a space for vibrant cultural activities, or even on weekends for displaying thrift stores or open-air exhibitions.

Diversifying activities to ensure maximum participation was one of the main objectives behind creating spaces like this. The 5th floor was connected to this cultural space through a public garden, adjacent to semi-shaded food courts on both sides. These food courts were strategically segregated from the residential common facilities (on the North and south) to maintain the residents' privacy.

After the spatial and structural articulation, which was only a suffocating circulation space/driveway on the east and west wing of the site, became the most active and vibrant spaces through various activities and participation, possessing future potentials for expansion.

4.3. Residential block design program:

Program for the residential block was also structured to benefit a large spectrum of target groups. Since the site is

closer to Myeongdong, Itaewon, and university areas where the single population dominate, 'one-room' (30 m^2 each) was included in the program considering its cost efficiency and popularity among students and single people. Type-B housing was developed as two people households (50 m^2 each) designated for middle-income couples. Type – C apartments (160 m^2 each) were for four people households. The objectives of diversifying apartment types were to create a diverse community to sustain the project for an extended period of time. As an attempt to build community, communal facilities such as laundry service, gymnasium, party room, and even roof gardens were included in the residential block program.

One room housing was arranged in 6th, 7th, and, 8th floor of the Chyeonggye sangga. Separated by the central junction space on the 5th level, studio apartments occupied 6th to 10th floor of Daerim. The 11th – 13th floor was 4 family apartments oriented to the north and south with separate common facilities. This way maximum thermal comfort, lighting, ventilation and magnificent view towards Namsan and Jongmyo shrine was achieved in the units.



Figure 11. View towards Redeveloped Chyeonggyesangga.

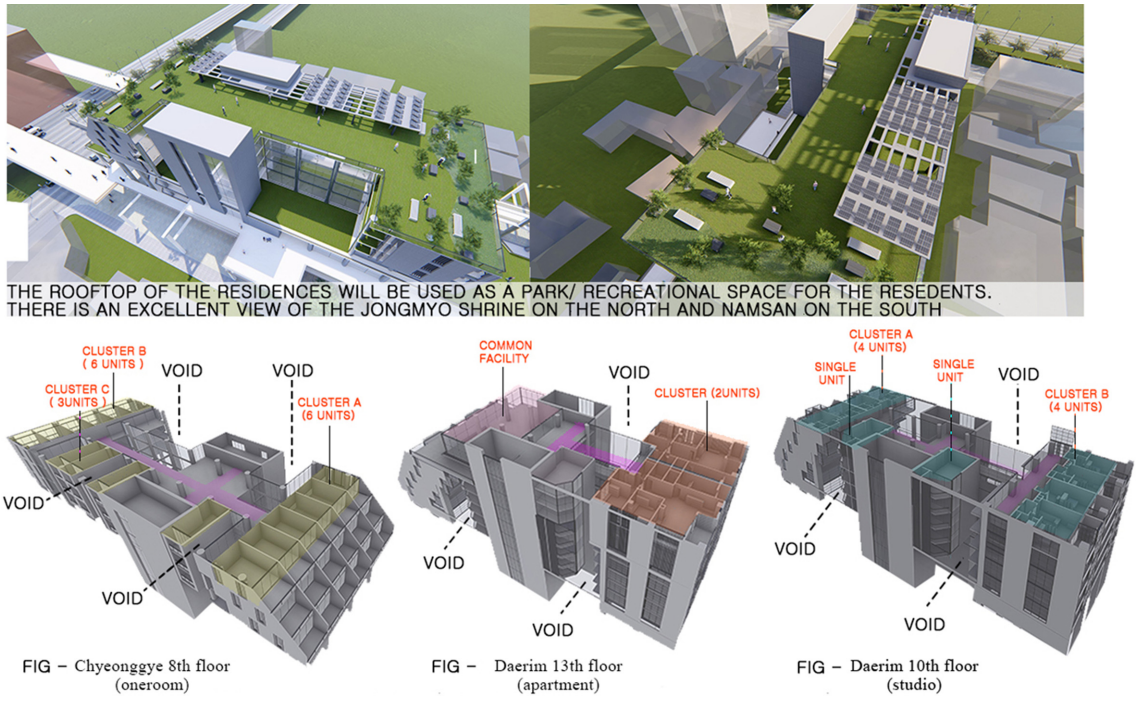


Figure 12. Roof planning and module placement. (residential block)

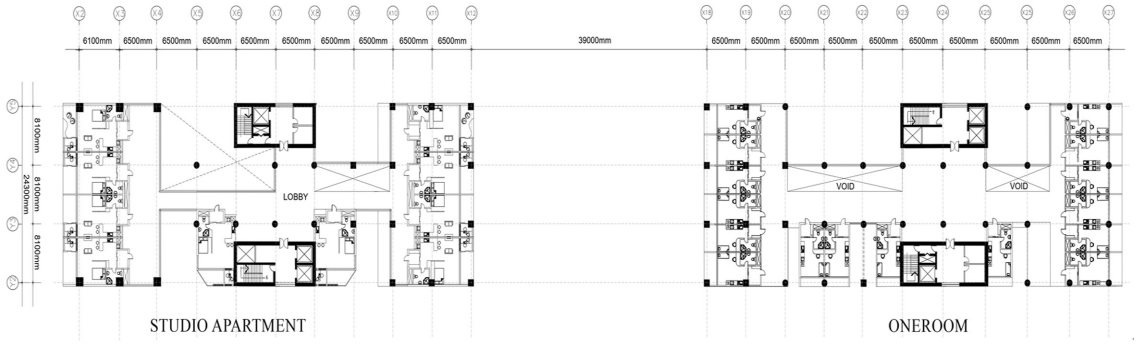


Figure 13. Residential floor key plan.

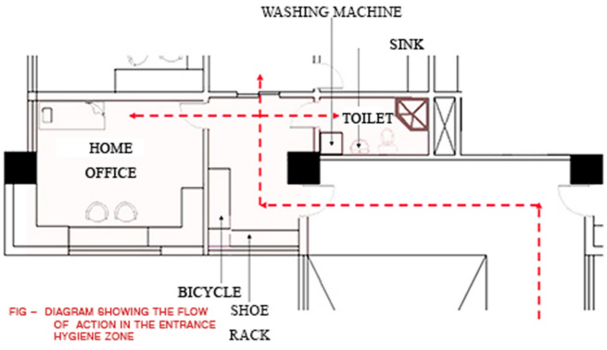


Figure 14. Flow of activity of hygiene zone.

4.4. Residential unit placements

The most significant consideration in redesigning the apartments was to ensure maximum thermal comfort, energy efficiency by utilizing maximum daylight and natural ventilation. The most challenging factor was the unusual orientation where the longer axis of the site lies along the east -west. Maximum number of units needed to be allotted on the north and south to avoid solar discomforts of the east and west. But placing units in this manner on such a linear site meant wastage of space, compromising financial credibility of the project.

As a solution to this, voids were introduced strategically between unit clusters to ensure natural ventilation and sunlight, while still ensuring allotment of maximum number of units on each floor. One-room apartments were segregated from the studios and family apartments deliberately, and even the shared facilities were segregated between the studio apartments and 4 family apartments in the same building block vertically, to ensure privacy. Community promoting decisions were reflected on the rooftop gardens, where sitting spaces were arranged by shielding the unsightly plumbing and exhaust pipes that penetrated through the roof.

Multi-activity spaces on rooftops were both shaded by canopies and open to the sky.

The canopies served as surfaces for solar panels. Electricity produced from these will lit up the lobbies reducing dependency on the city grid. Open to sky spaces formed playgrounds and observatories on the north and south. On the 5th floor, green terraces were introduced on the east and west, ensuring depth to allow reduction of solar heat intake into the corridors.

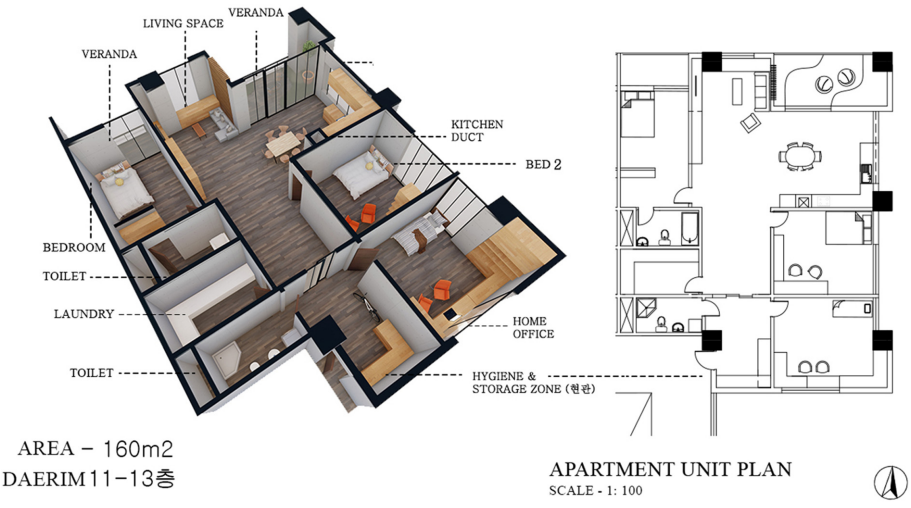


Figure 15. Apartment module. (Type – C)

4.5. Residential unit design considerations:

In unit designs, each function was allotted the most optimum dimension. Maximum number of units were placed facing the north and the south with a few placed on the east, where sufficient shading and ventilation were ensured by introducing voids in between modules. Considering the COVID-19 situation, on the entrance of each type of unit, a special 'hygiene zone' was planned, segregated from the indoor environment and organized to manipulate a distinctive type of flow of action. On entry, one has to put the articles on a designated shelf to be disinfected later, enter a washroom adjacent to this zone, put the clothes for washing, sanitize themselves thoroughly, and then enter home, as a process of maximum protection from the virus penetrating the home environment.

In the apartment (type C) units, a home office was planned in close proximity to this zone so that, an outsider visiting can leave without having to go into the living area. North and south facing balconies with full length glass windows ensured proper ventilation and lighting, prerequisite to maintaining a virus-free indoor environment. In the studio apartments, considering the office culture during post covid era, a small 'workplace cubicle' was provided adjacent to the balconies, which could be ventilated naturally and in extreme weather by the high efficiency indoor air conditioning/heating system. In the case of both members being office workers, if the cubicle is occupied by one member, the other member could transform the kitchen compartment adjacent to the living room as his/her own private 'home office zone'.

5. Synthetic proposal

The pacing of urban development needs to adjust to the needs of people, not only to the advancement of technology. This is on the basis that, the purpose of urbanization and advancement of technology is to sustain the urban community and help it progress, not to destroy its originality. All of the redesign ideas in this paper were derived from this apprehension. As a mixed-use project, the most challenging aspect was achieving privacy for the residential zones. This was solved by segregation of public pedestrian from the private, by introducing new pedestrians for the public zones (previously vehicular roads and unorganized surface parking). The newly introduced pedestrians, combination of a shopping street and terrace shaded spaces, were elements to enliven the abandoned eastern and western wings by engaging in various usages. The concept was to make people feel the nuance of the traditional shopping street similar to the peripheral fabric by making a shared circulation space between the existing and the newly proposed lower floor shops in the Daerim Chyeonggye building. To increase participation, diversified programs and the central void space for multi-level usage were introduced. This space not only broke the monotony of the linear building but also assisted visual connectivity and natural lighting and ventilation in the central lobby composed of colonnades unlike the other two mechanically maintained ones on the entries. For residential units, keeping in mind the risk of gentrification, units were proposed for diverse social classes and income ranges. Energy efficiency and quality community life was prioritized above all other factors. The attempt to make an energy efficient environment was not only confined to introducing voids between the units or roof slabs. In fact, in each type of unit, logical positioning of functions offering a comfortable indoor environment was the focus as well. As the site did not offer any greeneries horizontally, scopes for vegetation were created vertically, on both sides of the lobby spaces from the 5th floor upwards. The 5th floor rooftop, wrapping around the cultural void space and adjacent to semi shaded food courts, was a green garden open to public and, the roof spaces on the residential blocks were parks and observatories for the residents. Shaded spaces for community interaction and Solar panels for electricity supply in the lobbies were also installed. A holistic mixed-use project that offers a better environment and participation while protecting its originality and socio environmental values was achieved through these attempts in the Daerim Chyeonggye remodeling proposal.

6. Conclusion

Deriving an environmentally and socially compatible redesign proposal for the Daerim-Chyeonggye Sangga project was the goal of this research. In doing so, historical and contemporary socio-cultural, physical and economic contexts were analyzed for the effective application of sustainability strategies. In a mega scale project like the Daerim Chyeonggye Sangga, where horizontal site area is scarce, it is possible to create a sense of connectivity and transparency through strategic vertical planning, hierarchy of spaces and well-defined circulation planning with cost and energy efficiency, and environmental comfort in focus. This paper attempts to create an example of establishing a mega structure project with various complicacies as a catalyst of positive change in the surrounding areas while still retaining its historical, sentimental values and socio-cultural authenticity.

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