

Pursuit of creation of sustainable architectural space



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When I was asked to write for this issue on the special topic of the "creation of comfortable space," I first hesitated to accept the offer since I had specialized in "safe space" regarding earthquakes, but not in "comfortable space." I did, however, accept the offer, and this may be because I had a little bit of hope that, during the course of writing, I may be able to get some clues for promoting earthquake retrofits that prioritize the securing of "safe space." So, when I started to build up the concept for the article, what came to my mind was the restoration, preservation, and renovation plan of the Marunouchi station building at Tokyo Station in which I am currently taking part, and then a book of "Space, Time and Architecture" by Siegfried Giedion (translated into Japanese by Minoru Ota), which I had had a hard time understanding but was strongly impressed by during my student days. I may have simply reacted to the word "space".

To start with, I looked for this text in my bookshelf so that I could read it again, but I was not able to find it. Since this was published a long time ago, I thought it may have been out of print, so I searched on the Internet. There I found that a new edition, translated into Japanese, was published in 1969 ("Space, Time and Architecture" written by S. Giedion, translated by Minoru Ota, published by Maruzen in 1969), so I went to Maruzen Bookstore to purchase it. According to the foreword by the translator, the one that I purchased when I was a student was the enlarged third edition originally published in 1954 which was translated into Japanese and published in 1955. This book underwent a few enlargements and revisions afterwards and it turned out that the fifth edition was published in 1967, and it was translated into Japanese and published in 1969. This work has a large volume with over 1,000 pages and significant enlargement was also made, such as the addition of "Introduction: Architecture in the 1960's." Also, as I recalled from my student days, this book is too difficult to skim through quickly, but if I read it, and with some help from my own memory, I think that the concept and the understanding of architectural space described in the work can be well accepted in the present time and also offers many suggestions for the future. As before, I was again impressed that the author effectively used his own educational background in engineering and art history to discuss architectural space as well as urban space by contrasting architecture, art, and engineering through such examples as "architecture and art," "architecture and sculpture," "architecture and engineering," "architecture and structure," and "architecture and aesthetics."

Although this book does not directly discuss the topic of this issue, there are some parts that offer a number of valuable suggestions. One of the examples is the part where the author cited a passage by Cesar Dali (1867), "Does architecture have to give way for engineering? Do architects have to lose their honor because of engineers?" because in the 19th century engineering was prioritized over architecture, then cited a passage by Le Corbusier, "The century of machines awoke architects. New subjects and possibilities created such architects. These architects are now all over the world, doing their work (1924)," and finally concluded that "it is true that, after a century of tough battle, modern architects became able to design without falling far behind in terms of structure. There are always new problems and subjects for today's architecture. Today's architecture has to meet various requirements that are something more than rational. In other words, the architecture of today must satisfy the requirement of being able to achieve the resolution of various new architectural problems that certainly cannot be resolved merely through construction technology that is used on-site. Meeting various emotional requirements that are deeply associated with our own time is essential for successful modern architecture."

Profile:

- 1936 : Born in Okayama, Japan
- 1959 : Graduated from the Department of Architecture, Faculty of Engineering, University of Tokyo
- 1961 : Graduated from the School of Mathematics and Physics Research, Graduate School of University of Tokyo
- 1980 : Taught as a professor at the Institute of Industrial Science, University of Tokyo
- 1993 : Became the Director of the Institute of Industrial Science, University of Tokyo
- 1995 : Became the vice president of the Architectural Institute of Japan
- 1996 : Became a professor emeritus of the University of Tokyo
- 1996 : Became a professor of the Department of Architecture and Building Engineering, Faculty of Engineering, Shibaura Institute of Technology
- 1999 : Became the president of the Architectural Institute of Japan
- 2001 : Became the president of the Japan Association for Earthquake Engineering
- Present : President of the Japan Building Disaster Prevention Association and the Director of the Building Technology Research Institute, The Building Center of Japan

My profession in earthquake-resistant structures began around the time this book was published; therefore, the reality of the matter is that I am unaware of how this conclusion has been assessed to date. However, I came across such architectural theory for the first time in a long time and thought this theory was not strange at all in the modern era. Especially, I believe that the second half of the conclusion would be worth referring to when considering "amenity" which is the special topic of this issue. For example, if "amenity" is considered as a rational or practical requirement, then "creation of comfortable space" may disappoint Giedion, but at the same time, if "amenity" is considered in accordance with the modern architecture that he intended, then how to understand "amenity" as an emotional requirement may become the important point of discussion.

Since I specialize in earthquake engineering, setting aside the "amenity" issue for a moment, I would like to refer to the first half of the conclusion where Giedion mentions structures. When Giedion says "... after a century of tough battle, modern architects became able to design without falling far behind in terms of structure," I think what he tries to say is that "structural study or structural engineering has reached the level where it can freely construct space that architects intend." As long as this discussion focuses on architecture in European countries where earthquakes do not occur, it has a point, because the technology to create a safe structure against vertical load was well-developed by the time the discussion was made.

It has to be pointed out, however, that the situation is different in Japan, where earthquakes occur frequently. Seismology and earthquake engineering, which rapidly developed around the time that Giedion wrote the book, taught us that development of earthquake-resistant structures was not sufficient to freely express intentions of architects. In other words, although there are a lot more restrictions on architecture in a country with frequent earthquakes than on architecture in a country without frequent earthquakes, buildings with safety problems were constructed due to the loose seismic criterion of that time. No matter how satisfyingly the rational as well as emotional conditions were met, it is still a problem if buildings do not meet their earthquake resistant safety conditions. This problem is not unique to Japan; this problem is common to countries across the world which have frequent earthquakes. In fact, Japan was one of the first countries to note this problem and has implemented measures to require higher earthquake resistant properties for buildings since the 1980's. Especially for existing buildings, it has been recommended that evaluation of seismic capacity and earthquake retrofit be carried out.

It was during the 1970's that I started to be involved in evaluation of seismic capacity and earthquake retrofits as one of my professions. It is not surprising that numerous problems arise since a building that has been used without any fear of earthquakes is retrofitted in order to strengthen it against an earthquake with no known timing of occurrence. For example, when we try to add earthquake resistant walls made of reinforced concrete during the course of a school building retrofit, there will be opposition to building a new wall and thus dividing the faculty room or complaints that building a wall would be obstructive and prevent an unhindered view of the room arise. Therefore, it is necessary to continuously hold discussions with the school staff and have some options available, such as changing wall layout or the overall planning. Also, there may be pointless debate where steel braces spoil the building design or diagonally arranged materials in a

classroom will have educationally adverse effects on children. Nevertheless, for general buildings, we must explain the necessity of an earthquake retrofit and ask the users to endure some inconvenience.

Earthquake retrofits for historical architecture are troublesome. Recently, there are increased opportunities for me to be involved in evaluation of seismic capacity and earthquake retrofits for historic architecture. A stone lighthouse made in the Meiji period, the main building of the Ministry of Justice, the National Museum of Western Art, the chapel of Rikkyo University, the main building of the Industrial Club, the Marunouchi station building at Tokyo Station that is currently under renovation, and the former military facility at the city of Zentsuji are major examples.

Most of the buildings that will undergo retrofit for preservation purposes have a problem in their earthquake resistance. This is because these buildings were constructed during the periods before seismic engineering was developed. The majority of historical structures, including architecture, are not only just "old" but also are successfully "meeting various emotional requirements that are deeply associated with our own time," according to Giedion. Therefore, improvement of earthquake resistance while maintaining the concept of the existing design is far more difficult than implementing an earthquake retrofit plan to some general buildings.

I encountered this problem in 1995 when I was assigned as the chairman of the review committee for earthquake retrofit of the National Museum of Western Art, established in 1959 based on the basic design by Le Corbusier. It is unfortunate that this establishment is not introduced in the abovementioned book although this book has many pages on Le Corbusier. This National Museum of Western Art is the only establishment in Japan that Le Corbusier was involved with. My apologies to Le Corbusier, but the evaluation of seismic capacity of this building was terrible, we had to conclude that this building survived thus far only because no big earthquakes had hit the building. If left untreated, visitors may be in danger. At the same time, however, it was not possible to transform its piloti structure (soft first story structure), reminiscent of La Villa Savoya, into a wall structure. In the committee meeting, various opinions were voiced by the members and intense debate took place, and we concluded that we would use a base-isolation system while the current structure itself would be left untouched. The cost of renovation was estimated to be higher than the cost of constructing a new building, but it was finally decided that it was going to be the first renovation involving introduction of the base-isolation because this method was sufficiently developed for practical application and also because everyone admitted that this architecture was successfully "meeting various emotional requirements that are deeply associated with our own time." Since then, the same method has been used for other buildings.

For the Marunouchi station building at Tokyo Station, a renovation plan using the base-isolation system is also currently proceeding. This means that the architectural value of the station building has been recognized. Whether it is that a building meets the rational requirements, emotional requirements, or the requirement for "comfortable space" that is the featured topic of this issue, I believe the important thing is that regardless of the age, if a building can satisfy the requirements of a multitude of people who live in that age, the building will continue to exist into the future.

Notes from editorial staff:

Citations in the text of "Space, Time and Architecture" are translated into English from the Japanese translation of this text. Therefore, Their English is not the same as the original.