

# The Development of Metabolism after Expo 70

A study on the influences of Metabolism of the Japan World Exhibition in Osaka in 1970  
on the later design work of Kenzo Tange

AR2A011 Architectural History Thesis  
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18-04-2024

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*Note.* Festival Plaza, Expo '70, Osaka: a lateral view of the space-frame roof of the Theme pavilion showing the escalators and access galleries. From *RIBApix*, by J.M. Richards, 1970.  
([https://www.ribapix.com/festival-plaza-expo-70-osaka-a-lateral-view-of-the-space-frame-roof-of-the-theme-pavilion-showing-the-escalators-and-access-galleries\\_riba18235](https://www.ribapix.com/festival-plaza-expo-70-osaka-a-lateral-view-of-the-space-frame-roof-of-the-theme-pavilion-showing-the-escalators-and-access-galleries_riba18235)).

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**Abstract** – Kenzo Tange, a prominent architect and figure in the Metabolism movement, played a significant role in shaping Japanese architecture. His designs often combined modernism with traditional Japanese styles, incorporating Metabolist principles such as the use of multiple towers and sky corridors for traffic flow. The Japan World Exhibition in Osaka in 1970, with the imposing space-frame roof and partly designed by Kenzo Tange, served as a showcase for Metabolist ideas and marked the peak of the movement. It is therefore intriguing to explore how Kenzo Tange's involvement in designing the exhibition influenced his subsequent architectural designs.

Despite being designed decades after the peak of the Metabolism movement, Tange's later works still reflect its influence. Tange's Tokyo Metropolitan Government Building and the Fuji Television Building exemplify Metabolist principles, featuring innovative designs that integrate technology, flexibility, and functionality. Both of these later designs consist of grouped towers, sky corridors, and a futuristic aesthetic. However, some aspects of Tange's designs, such as the use of concrete and the lack of flexibility for future adaptations, raise questions about their long-term sustainability and suitability for evolving societal needs. Overall, the research highlights the evolution of Metabolism in architecture and Kenzo Tange's enduring influence on the movement, even as architectural trends shifted over time.

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**Key words – Metabolism, Kenzo Tange, Expo 70, architecture**

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# 1. Introduction

## 1.1 Subject

The bombings of Hiroshima, Nagasaki and parts of Tokyo at the end of the Second World War in 1945 created gigantic open spaces in Japan and gave architects the opportunity to completely redefine areas, focusing mainly on modern architecture. A new movement emerged in the early 1960s, Metabolism, which had a significant influence on Japanese architecture, culminating in the Japan World Exhibition, Osaka, 1970 ('Expo 70'). Metabolism was greatly influenced by the ideas and work of Japanese architect Kenzo Tange, who was also responsible for Expo 70. However, Expo 70 was a merger of experimental designs of Metabolism, which might have enriched and changed the view of some architects, such as Kenzo Tange. It is therefore interesting to investigate how the exhibition developed by Kenzo Tange influenced his own design work after the exhibition.

In addition to the academic added value of this research, this research also stems from a personal desire to learn more about a form of architecture, in this case Metabolism, that is far removed from what is usually seen in Europe and taught in architectural schools. Hopefully this history thesis will lead to a broader view of architecture and its history, both from a personal and reader's point of view.

## 1.2 Research questions

*Main question:*

How did Metabolism of the Japan World Exhibition, Osaka, 1970 influence the later design work of Kenzo Tange?

*Sub questions:*

- What are the characteristics of Metabolism?
- Who is the figure Kenzo Tange?
- Which projects did Kenzo Tange design after Expo 70?
- Which similarities and differences can be found between Expo 70 and the selected designs of Kenzo Tange after Expo 70?

## 1.3 Structure

The history thesis is divided into five more chapters. Chapter 2 (Historical framework) gives an answer to descriptive sub questions, using a variety of literature and articles. The necessary information is provided about the concept of Metabolism, Expo 70 and architect Kenzo Tange. This chapter serves as background information for the reader to understand the research. Chapter 3 (Methodology) talks about the type of research and the reason behind it. It also shows how the research, the collection of the results, is set up. Chapter 4 (Case studies) gives an answer to non-descriptive sub questions. It includes an analysis of the three selected case studies designed by Kenzo Tange and looks for the differences and similarities between the case studies and the impact they have. The three selected case studies are the Space-frame roof (Osaka, 1970), Tokyo Metropolitan Government Building (Tokyo, 1991) and Fuji Television Building (Tokyo, 1996). Chapter 5 (Conclusion) is a summary of the results after examining the case studies and gives an answer to the main research question. Chapter 6 (Discussion) is an evaluation and critical reflection of the results and provides suggestions for further research.



## **2. Historical framework**

### **2.1 Metabolism**

After the atomic bombing of Japan in the Second World War and the ongoing vulnerability to natural disasters Japan has to deal with due to its geographical location, various architects felt the need to start a new movement that would respond to these challenges (Schalk, 2014). Four young architects - Kiryonori Kikutake, Kisho Kurokawa, Fumihiko Maki and critic Noboru Kawazoe - formed a group and founded the Metabolist movement between the late 50s and early 60s. Their primary focus revolved around cultural resilience as a concept tied to national identity (Schalk, 2014). Metabolism comprises both urbanism and architectural design by mediating between large infrastructures and the freedom of the individual (Schalk, 2014). This freedom could be achieved by comprehensive planning, the dissolution of the city into 'cells' (Lin, 2010). They started with the Japanese social and cultural context but also stressed the universal relevance and application of the emerging models, so their ideas and solutions were not limited to Japan.

The Metabolists criticised the non-transparent forms of power of the entire Japanese planning system and believed the reconstruction in Japan after the Second World War had failed. The organic concepts and the acceptance of Japan as ground zero was their proposal to find an organic link between the fundamental cultural pattern in Japan and the individual (Wendelken, 2000).

The Metabolist ideas in their designs are characterised by groups of towers, large city plans called megastructures, entire floating cities and the relief of traffic congestion through the use of sky streets. Some Metabolist architects even thought that entire parts of buildings should be able to be replaced after they had served for a certain period of time, similar to the different phases of human life. Architecture had to be mobile and ephemeral instead of permanent. Flexibility was their motto (Kunstbus, 2023).

However, many of the plans and designs Metabolist architects had in mind were not realised due to technological limitations. Concrete cast-in-situ was the most cost-effective material for constructing large buildings at that time, but yet the Metabolism movement is rooted in the ambition to showcase the effectiveness of prefabricated modules, aiming for precision and effortless usability. In that respect, this architectural movement was far ahead of its time (Wang, 2022).

All of the founders of the Metabolist movement were heavily influenced by their professor and well-known architect Kenzo Tange. Although Kenzo Tange was never a formal member of the Metabolists, he nevertheless played a significant role by developing Metabolist principles in his own designs (Lin, 2010).

### **2.2 Expo 70**

Metabolism became the architectural style for not only reconstruction but also for modern, civilised Japan. Metabolism had a significant influence on Japanese architecture in the 60s, with the Japan World Exhibition in Osaka in 1970 as the clear highlight. The Japan World Exhibition in Osaka in 1970, briefly 'Expo 70', could be seen as the apotheosis of Metabolism and restored

the self-confidence and the faith of the Japanese people (Gardner, 2020). Kenzo Tange was commissioned to develop the master plan of the exhibition. He envisioned the exhibition as a tree with a trunk (Symbol Zone), branches (moving walkways and streets) and flowers (the different national pavilions). Tange therefore respected the initial idea of professor Uzo Nishiyama, who wanted an exhibition that was set around a “Festival Plaza”, which ultimately turned out to be the icon of Expo 70. To protect the Festival Plaza from the rain and to create something iconic to Expo 70, Tange partly designed “The Big Roof”. This gigantic space-frame roof will be analysed later.

### **2.3 Kenzo Tange**

Kenzo Tange (1913-2005), shown in Figure 1, was a Pritzker-Prize winning architect from Japan who had a big impact on Japanese architecture and was one of the most significant architects of the 20th century. He usually combined traditional Japanese styles with modernism, and eventually developed Metabolist principles in his own work. Although he was trained as an architect at the University of Tokyo, Tange was also honoured as an urban planner and was therefore allowed to design both small and large projects all over the world. As an urban planner, he helped rebuild Hiroshima after the Second World War. Being a member of CIAM (Congrès Internationaux d'Architecture Moderne) in the 1950s eventually brought him even more worldwide recognition (AD Editorial Team, 2019).

In 1960, Tange influenced the Metabolist movement with his “Plan for Tokyo 1960”, an enormous unrealised structure spanning across the bay of Tokyo, which was intended to make change and growth possible (AD Editorial Team, 2019). He supported the Metabolist movement in the following years, which becomes particularly clear by designing the master plan of Expo 70. Tange’s style was modernist and influenced by other architects such as Le Corbusier from an early age, but he was also inspired by Japanese traditions. The role of traditions in his designs becomes clear from his famous quote:

“The role of tradition is that of a catalyst, which furthers a chemical reaction, but is no longer detectable in the end result. Tradition can, to be sure, participate in a creation, but it can no longer be creative itself.” - *Kenzo Tange, 1957*

Kenzo Tange had a strong idea of what the future of architecture should look like, and demonstrated this with features of Metabolism and Brutalism in his own work. With his designs he probably also wanted to oppose the postmodernism of the 1980s, which he regarded as an architecture of just “transitional architectural expressions” (AD Editorial Team, 2019). From what it seems, he was so ambitious and passionate about his ideas, that he continued working until three years before his death in 2005, at the age of 91.



**Figure 1:** Kenzo Tange in the Palace on Dam Square in Amsterdam, the Netherlands, invited by Queen Beatrix and Prince Claus. From Wikipedia, by H. van Dijk, 1981. ([https://en.m.wikipedia.org/wiki/File:Kenzo\\_Tange\\_1981.jpg](https://en.m.wikipedia.org/wiki/File:Kenzo_Tange_1981.jpg)).

### 3. Methodology

This qualitative research concerns a literature study into the history of architecture. Academic literature was collected using Google Scholar. However, this did not always provide enough information, so a range of architectural websites and articles were also consulted. This could include ArchDaily, but also the visitor site of one of the selected buildings. Primary sources have also been used as much as possible. However, there was often no access to these sources, such as Kenzo Tange's own books, and the information had to be obtained from elsewhere sometimes.

For this research, three designs by Kenzo Tange were selected, the so-called case studies. The first case study concerns the Space-frame roof of the Expo 70. This design can be considered the pinnacle of the Expo 70 and the crowning achievement of Metabolism and serves as a starting point against which the other case studies are compared in terms of Metabolic characteristics. The other two case studies concern the Tokyo Metropolitan Government Building and the Fuji Television Building. These designs were chosen because they are also located in Japan, so that international architectural influences have as little effect as possible on the result of this research. In addition, these buildings still have a major public function to this day. Finally, these two designs were built more than 20 years after the first peak of Metabolism, making the analysis and comparison more interesting.

Each case study starts with an introduction to the design, after which the Metabolic characteristics in the design are sought and analysed. This is done by both retrieving information from literature and a personal analysis of the design. The conclusion summarises and links the results to provide an answer to the research question. This research is valid and reliable because the same method is applied to each case study and the literature used substantiates the personal analyses of the case studies.

## 4. Case studies

### 4.1 Space-frame roof, Osaka (1970)

After the Second World War, world exhibitions served as benchmarks for significant technological advancements in the realm of architectural structures. In this remarkable period after the Second World War, the quantity of structurally significant designs at world exhibitions experienced a substantial rise (López-César, 2019). Every world exhibition had a slightly different approach when it came to representing structures, with the Expo 70 in Osaka featuring the presence of pneumatic structures and space frames. The Festival Plaza, the spatial megastructure that functioned as the heart of the exhibition, was the largest and most important space frame, as shown in Figure 2. The space-frame roof was part of a large organic structure, similar to a tree, in which the space-frame roof functioned as the trunk and the moving walkways and streets, which were connected with the space-frame roof, functioned as the branches, as shown in Figure 3 and 4. This design allowed passage in certain areas between its two layers and, ultimately, could be inhabited and was therefore an important part of the concept Tange had in mind (López-César, 2019).

The Festival Plaza was envisioned as an emblem of information exchange, designed by Tange to be an "invisible monument" at the heart of Expo 70 (Gardner, 2020). He conceived a spacious plaza, open on its sides, topped by an expansive space-frame roof constructed from prefabricated steel pipes and ball joints arranged in a triangular lattice, covered with a lightweight, translucent polyester film (Gardner, 2020). Standing out amidst Tange's rational design was Okamoto Tarō's exuberant Tower of the Sun, breaking through the roof with its flamboyant presence, serving as a whimsical contrast to Tange's cool and calculated approach (Gardner, 2020).

Metabolists Kenzo Tange and Yoshikatsu Tsuboi, who designed the Space-frame roof, were deeply influenced by earlier designs and proposals (López-César, 2019). In 1960, Hungarian architect Yona Friedman introduced his "Spatial City" concept, which envisioned a vast, multi-layered structural grid that could be situated above lakes, rivers and even urban areas. The world exhibition of 1967 in Montreal showed the United States Pavilion, designed by Richard Buckminster Fuller. This pavilion consisted of a computerised climate control system and controlled shading systems that could be adjusted to the position of the sun. Fuller was probably inspired by the space race between the United States and the Soviet Union, which reached its peak around that time.





**Figure 2:** Festival Plaza, Expo '70, Osaka: a lateral view of the space-frame roof of the Theme pavilion showing the escalators and access galleries. From *RIBApix*, by J.M. Richards, 1970.  
([https://www.ribapix.com/festival-plaza-expo-70-osaka-a-lateral-view-of-the-space-frame-roof-of-the-theme-pavilion-showing-the-escalators-and-access-galleries\\_riba18235](https://www.ribapix.com/festival-plaza-expo-70-osaka-a-lateral-view-of-the-space-frame-roof-of-the-theme-pavilion-showing-the-escalators-and-access-galleries_riba18235)).





**Figure 3:** Expo '70, Osaka: a general view of the raised, moving walkway and the boulevard below. From *RIBApix*, by J.M. Richards, 1970.

([https://www.ribapix.com/festival-plaza-expo-70-osaka-a-lateral-view-of-the-space-frame-roof-of-the-theme-pavilion-showing-the-escalators-and-access-galleries\\_riba18235](https://www.ribapix.com/festival-plaza-expo-70-osaka-a-lateral-view-of-the-space-frame-roof-of-the-theme-pavilion-showing-the-escalators-and-access-galleries_riba18235)).



**Figure 4:** Aerial view, Expo '70, Osaka, 1970. From *Old Tokyo*, by unknown, 1970.

(<https://www.oldtokyo.com/expo-70-osaka-1970/>).



## 4.2 Tokyo Metropolitan Government Building, Shinjuku, Tokyo (1991)

### *Design*

Over three decades following Kenzo Tange's initial design for a Tokyo metropolitan government administrative building, he was once more tasked with designing its administrative centre. The building with its prominent appearance in the skyline of Tokyo, completed in 1991, would be one of his last projects. With this design, Tange refers to the city that is, as it were, ruled by inhabitants, creating a kind of balance between the traditional and modernist (Bryant-Mole, 2018).

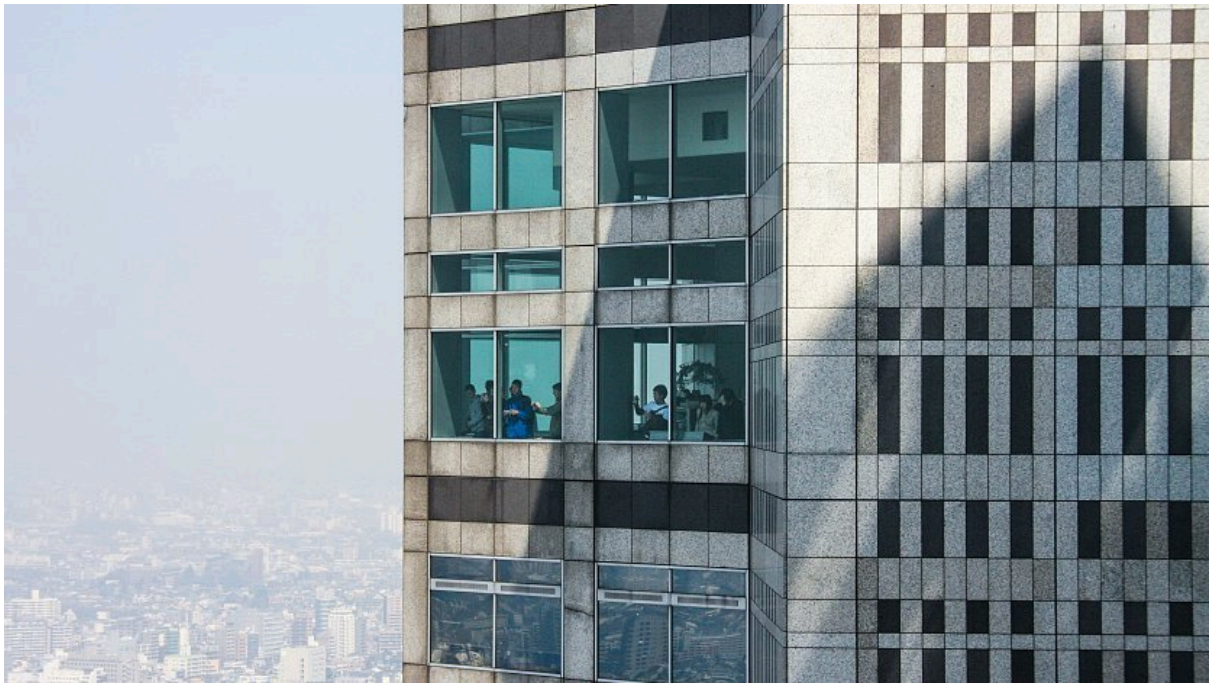
The Tokyo Metropolitan Government Building, as shown in Figure 5, actually consists of three different buildings or structures, connected by pedestrian routes. These pedestrian routes are designed in the form of bridges, which are located above the intersecting roads and could be described als “sky corridors”.

The main building is the tallest one with a height of 243 metres and was the tallest building of Tokyo at that time. Tange opted for a facade adorned with precast concrete panels and accented with both light and dark granite, as shown in Figure 6. This diverse array of geometric patterns and the irregular arrangement add visual interest to the facade, preventing the building from appearing monolithic and enhancing its comprehensibility, despite its considerable height. The articulated panels also contribute to disrupting the strong winds that plague this tall building. Besides that, Tange found a solution for the necessary use of aesthetically unappealing satellite dishes, by designing cutouts at the tops of the towers that function as a frame for the satellite dishes, as shown in Figure 7. Tange was thus able to transform the obstacle of unattractive objects into decorative elements that enhance the building to a certain extent (Bryant-Mole, 2018).



**Figure 5:** Tokyo Metropolitan Government Building. From *Pinterest*, by B. Hassan, n.d.  
(<https://nl.pinterest.com/pin/tokyo-metropolitan-government-office-building--578642252127749882/>).





**Figure 6:** Geometric pattern of the facade. From *Japan Travel and Living Guide*, by Japan Travel and Living Guide, n.d. ([https://www.japan-guide.com/e/e3011\\_tocho.html](https://www.japan-guide.com/e/e3011_tocho.html)).



**Figure 7:** Tokyo Metropolitan Government Building No. 1. From *Wikipedia*, by Morio, 2003. ([https://commons.wikimedia.org/wiki/File:Tokyo Metropolitan Government Building no1 Tocho 10 7 December 2003.jpg](https://commons.wikimedia.org/wiki/File:Tokyo_Metropolitan_Government_Building_no1_Tochu_10_7_December_2003.jpg)).

The second building of the Tokyo Metropolitan Government Building is located south of the main building. For this part, Kenzo Tange designed three towers, instead of two as in the main building. However, that is not the only difference. The main building has a central, lower part between the two twin towers, where the three towers of the second building are interlocked, making the second building more massive. Tange has therefore consciously opted for a counterpart to the symmetrical design of the main building.

However, it is still clear that both parts belong to the same design, because of the same facade features. By not hiding the less aesthetically appealing architectural elements, in this case by placing them on the lower roofs, Tange shows again his architectural honesty (Bryant-Mole, 2018). Because of the consistency in his facade design and architectural elements, he was able to make a visual link between the individual components of the building, despite their differences in volumes.

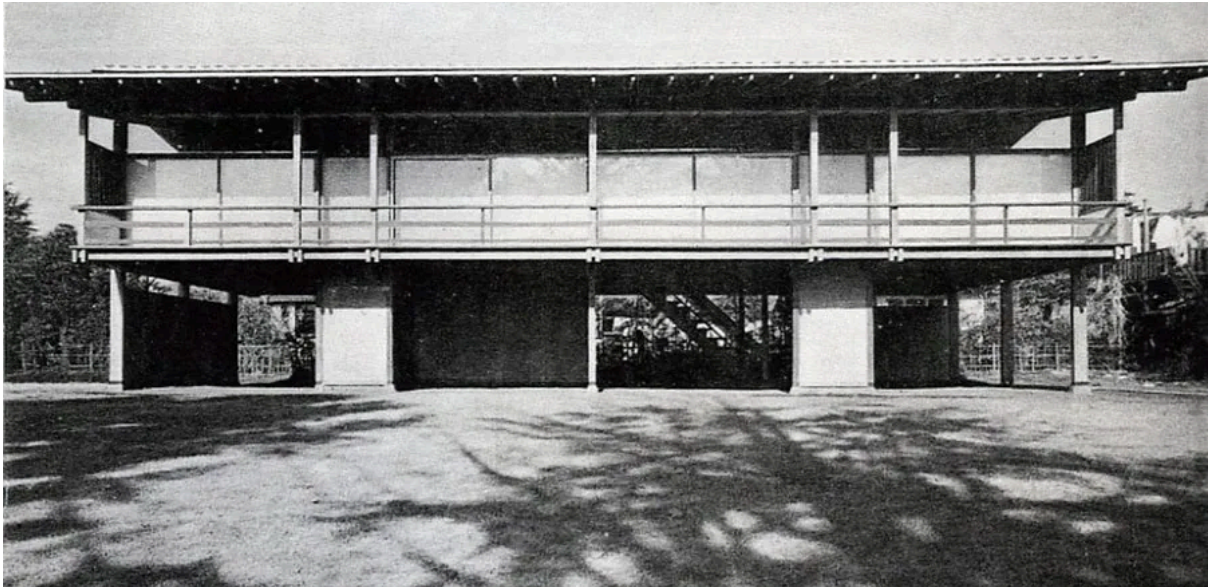
The facade design is also reflected in the third building of this complex, the Assembly Building, in which the councillors of Tokyo can meet each other. This part consists of a semicircular structure, located east of the main building on the other side of the street. This semicircular structure is only noticeable from one side, the courtyard. This courtyard is sunk below street-level, to separate passing road traffic from space for pedestrians. Furthermore, Tange designed a 1-storey high oval structure on top of the main semicircular structure, so that two sweeping curves in opposite directions can be seen from the courtyard side. This oval structure is probably designed to emphasise the main entrance of the third building.

### *Metabolism*

During the 1960s, Metabolic architects became aware that technology offers many opportunities. This obsession with technology by Metabolic architects became a specific feature of Japanese culture and architecture (Pernice, 2004). At the time of the construction of the Tokyo Metropolitan Government Building, Japan had a world-leading technology industry, with the computer chip as its national symbol. Kenzo Tange described his own architectural designs as “communication spaces” connected by “informational channels” (Tange, 1984). This rhetoric of technology, which refers back to the inventor of cybernetics Norbert Wiener, is reflected in his design for the Tokyo Metropolitan Government Building. The movements of people through the corridors and elevators in the main building represent the transmission of electrical signals in a computer chip (Bryant-Mole, 2018). This seemingly small detail is a significant reference to the connection that Metabolism had with technology.

For Metabolist architects, the Japanese social and cultural context was usually their point of departure. This also applied to the design process of Tange, but in his later designs, references to the architectural history of Japan became less obvious, but persisted nonetheless. The geometric pattern in the facade of the Tokyo Metropolitan Government Building refers back to the screen panelling of traditional Japanese houses, as shown in Figure 8 (Bryant-Mole, 2018). Also, the twin towers of the main building are reminiscent of the split towers of Gothic cathedrals in Europe. Thus, Tange did not limit himself to the architectural history of his home country for his own designs.

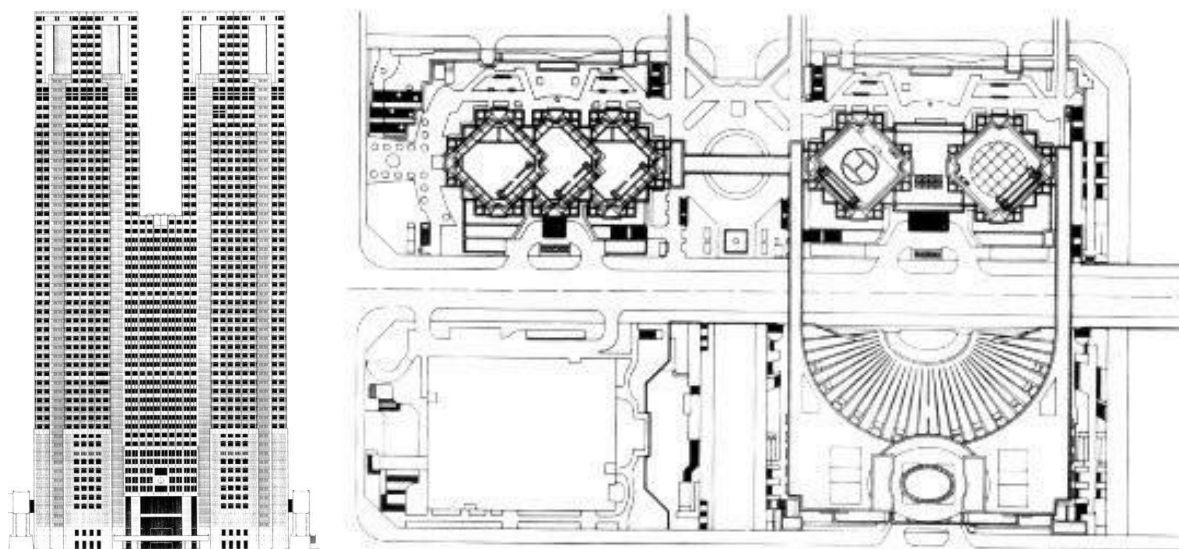




**Figure 8:** Tange's Residence Facade. From *ArchEyes*, by E. Stoller, n.d. (<https://archeyes.com/kenzo-tanges-house-villa-seijo/>).

A common Metabolist feature that can be discovered in many of Tange's designs is the use of multiple towers. This characteristic is also this time clearly noticeable, with the main building consisting of two towers and the second building comprising three interlocked towers.

Another characteristic of Metabolism is the reduction of traffic congestion in the city through the use of streets in the sky (Hu et al., 2020). This is exactly what Tange did on a smaller scale in his design for the Tokyo Metropolitan Government Building as well. The sky corridors connect the three different parts, as shown in Figure 9, allowing people to move quickly from one part to another, without having to go all the way down first. In that case, "traffic congestion" within the building is less likely to occur. The building represents the idea of mediating between large infrastructures and the freedom of the individual, although it is done on a smaller scale. The enclosed sky corridors between the different parts create a significant amount of flexibility and freedom for its users.



**Figure 9:** Elevation of No.1 Building and plan of the complex. From *ArchDaily*, by K. Tange, n.d. (<https://www.archdaily.com/793703/ad-classics-tokyo-metropolitan-government-building-kenzo-tange>).

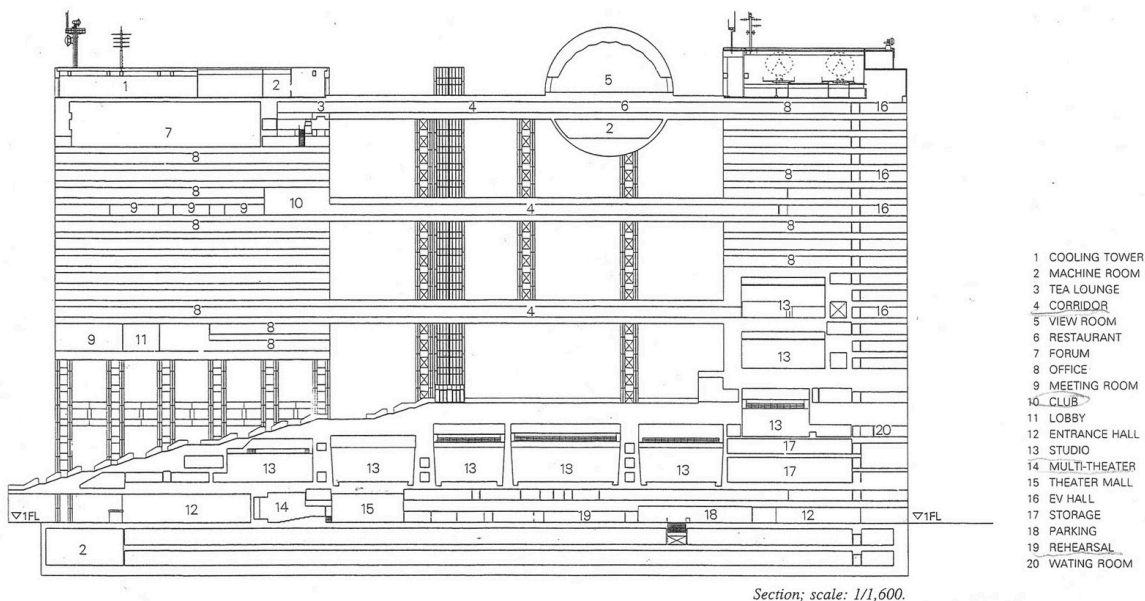
### 4.3 Fuji Television Building, Odaiba, Tokyo (1996)

#### Design

The Fuji Television Building, located in Tokyo, was designed by Kenzo Tange and completed in 1996. Tange had to fit offices, large-sized studios, medium-sized studios and broadcasting facilities, and an open space for visitors in one coherent building. Tange had the freedom to design whatever he wanted. For Tange, the challenge lay in designing the large-sized studios and the open space for visitors, because the large-sized studios have no columns, which means nothing could be built on top of it due to an open space (Fuji Television Network, n.d.). Tange solved this complication by lining up the five large-sized studios horizontally, arranging them side by side, with an office tower and a media tower at each end, as shown in Figure 10. The two towers are linked by three enclosed pedestrian bridges, also referred to as "sky corridors."

The construction of Fuji Television's new headquarters houses an advanced broadcasting centre and complements to the dynamic skyline of the waterfront area of Tokyo's Minato district, together with the surrounding architecturally innovative buildings (Seraj, 2016). With a total height of 123 metres, this design of Kenzo Tange is considerably larger than the surrounding buildings and embodies the finest qualities of what Japan has to offer.

However, the most striking part of the design is probably the unique spherical observation platform with a diameter of 32 metres, next to the media tower. For the exterior of the spherical observation platform, Tange chose salt-resistant titanium as the cladding material, which has an appealing reflective finish with a crisp colour. The other parts of the building are also clad with salt-resistant titanium and have a lot of aluminium curtain walls. The transparency represents the concept of the broadcasting centre, which wants to welcome the public and show they are not afraid of new and innovative ideas. The structure of the building is also highly earthquake resistant.



**Figure 10:** Fuji TV Headquarters. From *Architecture Tokyo*, by K. Tange, n.d.  
(<https://architecture-tokyo.com/2017/05/21/1996-fuji-television-kenzo-tange/>).





**Figure 11:** Fuji TV Headquarters. From *Architectuul*, by Architectuul, n.d.  
(<https://architectuul.com/architecture/fuji-tv-headquarters>).



Within architecture, it is construction-wise easier and financially better to design with rectangular forms, resulting in a lot of rectangular buildings nowadays. However, Tange embodied the use of different basic forms. The rectangular and square forms are present everywhere, not only in the building itself, but also in the open spaces being enclosed by the building. The pedestrian bridges, also known as the “sky corridors”, create big gaps between the bridges, as shown in Figure 11. These gaps create interesting look-throughs, give the building a certain depth and make the building feel less “heavy”.

The triangle form is hidden in the circulation space of the building, referring to the Tube Escalator and the Grand Staircase. The “see-through” Tube Escalator extends in a straight line from the ground level on the first floor to the rooftop garden on the seventh floor. The Grand Staircase can be found under the eaves of the office tower, as shown in Figure 12. Tange designed these to create a diagonal flow of people (Fuji Television Network, n.d.).



**Figure 12:** Fuji TV Headquarters. From *Architectuul*, by Architectuul, n.d. (<https://architectuul.com/architecture/fuji-tv-headquarters>).

The circle is probably the basic design element that makes this design unique, because of the spherical observation room. With a diameter of 32 metres and its position, 100 metres up in the sky, this sphere can be considered as the “symbol within a symbol” (Fuji Television Network, n.d.).

The supporting structure of the building consists of mast columns, in sets of four. The facade actually shows the structure with its mast columns. The facade is covered with aluminium curtain walls, to express both its vertical and horizontal structure.

The waterfront area, where the Fuji Television Building is located, should diffuse the concentration of Tokyo and be a place where the city can respond to internationalisation and information technology, according to Kenzo Tange (Fuji Television Network, z.d.). That is why he was strongly committed to the development of the Tokyo Bay area. Tange won a competition for the development of this waterfront area and designed the Fuji Television Headquarters Building, a state-of-the-art media centre in the Odaiba area that could be considered as a symbol of the entire Tokyo waterfront subcenter, as shown in Figure 13.



**Figure 13:** Fuji TV Headquarters. From *Architectuul*, by Architectuul, n.d. (<https://architectuul.com/architecture/fuji-tv-headquarters>).

### *Metabolism*

Kenzo Tange designed this building more than 20 years after the peak of Metabolism at Expo 70. Although the 90s were a completely different time than the 50s, 60s and even the 70s, Tange still managed to include some Metabolist ideas in his design for the Fuji Television Building.

The supporting structure of the building being earthquake resistant refers back to the origins of Metabolism. One of the reasons to start the Metabolist movement back in the 60s was about finding a solution to the ongoing vulnerability to natural disasters Japan has to deal with due to its geographical location (Schalk, 2014). This structural aspect is maybe not directly noticeable from the outside, but definitely an Metabolist aspect that Tange used in this design.

The metabolic feature of the grouping of towers that was clearly noticeable in the Tokyo Metropolitan Government Building, can also be seen in the Fuji Television Building. This building consists of two towers, probably because Tange wanted to separate offices and media. As in the Tokyo Metropolitan Government Building, one of the goals in the design for the Fuji Television Building was to avoid traffic congestion by using sky corridors. The sky corridors, as shown in Figure 14, connect the two towers on multiple levels, allowing people to move quickly from one tower to another, without having to go all the way down first. However, there are also other ways of separating functions and designing pedestrian routes. Building two towers with sky corridors in between means more building materials and more facades, which is not the most economic and sustainable way of building. Tange could also have chosen to design a simple, large block. However, that is not what Metabolism stands for and the broadcasting centre also wanted to show their innovativeness.

The enclosed sky corridors between the two towers create a significant amount of flexibility and freedom for its users, representing one of the principles of Metabolism (Hu et al., 2020). The Tube Escalator, the Grand Staircase and the sky corridors allow people to move through the large building in different ways and show similarities with how Expo 70 was conducted. The national pavilions at Expo 70 were connected with the space frame roof in the Symbol Zone through moving pedestrian walkways. Those moving walkways were described as the branches that connected the trunk on the one hand (Symbol Zone) and the individual flowers on the other hand (pavilions). The Fuji Television Building seems to have the same set-up, where the two towers represent the trunks, the sky corridors represent the branches of the trees, and the spherical observation platform with its impressive shining colour represent the flower. While in Expo 70 the Symbol Zone with its space-frame roof actually formed the centre, in the Fuji Television Building that function is fulfilled by the spherical observation platform, one could say.

The whole design of Expo 70 had to represent an aerial city, and this is also how Tange designed the Fuji Television Building. The high towers, the sky corridors and the spherical observation belong to the most important elements of the building and give users the opportunity to move and work up in the air, separated from the surface level. In contrast to the surface level, where everyday life continues as usual and which represents the present time, at the higher levels of the building you experience the future that Tange had in mind. A future world where humanity and technology come together.





**Figure 14:** Fuji TV Headquarters. From *Architectuul*, by Architectuul, n.d.  
(<https://architectuul.com/architecture/fuji-tv-headquarters>).

Lastly, Metabolism is also about mobile and flexible architecture, which could grow with the development of the modern complex society. It is debatable whether this design by Kenzo Tange succeeded in terms of flexibility. The building's functions and volumes still struggle to adapt to shifts in social, economic, and environmental dynamics (Hu et al., 2020). The building was not designed in an economically responsible manner; the interior spaces are unlikely to be suitable for future living spaces and the building is composed of volumes of concrete, which does not meet the expectations we have of sustainability today.

## 5. Conclusion

Based on the historical framework and the case studies examined, an attempt was made to answer the following research question: *How did Metabolism of the Japan World Exhibition, Osaka, 1970 influence the later design work of Kenzo Tange?*

The space-frame roof of the Festival Plaza at Expo 70 showcased Tange's fascination with megastructures and pneumatic structures, reflecting the technological advancements of the time. This marked a significant period of experimentation and architectural innovation following the Second World War. The space-frame roof was connected with the national pavilions on higher levels through the use of moving pedestrian walkways, also described as the branches that connect the tree with the flowers. This concept is strongly reflected in the two later buildings designed by Kenzo Tange: the Tokyo Metropolitan Government Building and the Fuji Television Building. Both designs contain sky corridors that connect different parts of the building. Those enclosed sky corridors create a significant amount of flexibility and freedom for its users and show the possibilities of advanced technology, which was also shown at Expo 70. It is also a way to reduce traffic congestion on ground level, similar to the concept of the aerial city. The use of grouped towers is a recurring feature of Metabolism as well.

Tange's Tokyo Metropolitan Government Building exemplifies his ability to blend traditional and modernist elements, creating a harmonious balance in the urban fabric. The use of sky corridors and geometric patterns in the facade reflects his Metabolist philosophy, emphasising connectivity and flexibility within the built environment. With the Fuji Television Building, Tange continued to push the boundaries of architectural design, incorporating a spherical observation platform and advanced structural techniques. Despite being designed over two decades after the peak of Metabolism, the building still embodies key Metabolist principles, such as earthquake resistance and flexible spatial configurations.

However, while Tange's designs showcase his visionary approach to architecture, they also raise questions about sustainability and adaptability to changing societal needs. It is debatable to what extent these buildings offer opportunities for growth. The rigid concrete volumes and lack of economic efficiency in some designs highlight the challenges of balancing innovation with practicality in contemporary architecture.

This research has shown that certain Metabolist features of Expo 70 had a clear influence on Kenzo Tange's later designs, despite being designed more than 20 years later. Kenzo Tange did not always adopt design aspects of Expo 70 one by one, but translated these Metabolist ideas into the spirit of the times and adapted them to the circumstances of the design in question.

## 6. Discussion

Kenzo Tange's incorporation of Metabolist features in his later designs, inspired by Expo 70, sometimes presents challenges in identification. The use of Japanese social and cultural context as the point of departure for instance was also an applied method within Metabolism before Expo 70. Therefore, assessing the extent to which Expo 70's Metabolism differs from earlier iterations is complex. Expo 70 can be viewed as the culmination of Metabolism, marking the pinnacle of an era rather than a distinct departure. It essentially encapsulates the essence of Metabolism and its contributions. Thus, the case studies not only undergo scrutiny against the design work at Expo 70 but also against Metabolism as a whole.

Furthermore, it is interesting to take a look at the use of primary sources in this history thesis. While direct interviews and architectural sketches from Kenzo Tange himself were scarce, secondary sources that did have access indirectly supported this research. Additionally, personally conducted analyses of projects through visual aids and comparisons offer valuable firsthand evidence compiled during the research process.

Further research could explore additional case studies. Investigating designs by Kenzo Tange outside Japan would provide insights into how Metabolism has transcended geographical boundaries over time.

## References

### General:

AD Editorial Team. (2019). *Spotlight: Kenzō Tange*. ArchDaily.  
<https://www.archdaily.com/270043/happy-birthday-kenzo-tange>

This article highlights Tange's contributions to architectural theory and practice. His work is praised for its innovative approach, blending traditional Japanese elements with modernist principles to create iconic structures that reflect the spirit of their time. The article also reflects on Tange's lasting legacy and influence on generations of architects worldwide.

Kunstbus. (2023). *Metabolistische architectuur*.  
<https://www.kunstbus.nl/architectuur/metabolistische+architectuur.html#:~:text=Hun%20idee%C3%ABn%20zijn%20gekenmerkt%20door,maar%20als%20beweeglijk%20en%20vergankelijk>

This article discusses Metabolist architecture and how the movement was characterised by its futuristic and organic designs, inspired by concepts from biology and technology. The article highlights key figures and projects associated with the movement and emphasises its innovative and visionary approach to architecture and urban design.

Lin, Z. (2010). Kenzo Tange and the Metabolist Movement. In *Routledge eBooks*.  
<https://doi.org/10.4324/9780203860304>

This book explores the life and work of Tange and his role in the Metabolist movement. The book delves into Tange's architectural philosophy, his influential projects, and his contributions to urban planning in postwar Japan. It also examines the broader cultural and historical context of the Metabolist movement, which sought to address the challenges of rapid urbanisation and modernisation in Japan. Through analysis of Tange's designs and their impact on urban landscapes, Lin offers insights into the aspirations and ideals of modern Japanese architecture.

Schalk, M. (2014). The architecture of metabolism. Inventing a culture of resilience. *Arts*, 3(2), 279–297. <https://doi.org/10.3390/arts3020279>

This paper examines the influence of Tange on the development of the Metabolist architectural movement in the 1960s. It analyses Tange's contributions to architectural theory and practice, focusing on his ideas about urbanism, technology, and the role of architecture in society.

Wang, T. (2022). *A Brief History of Metabolism in Architecture*. Journal.  
<https://architizer.com/blog/inspiration/stories/history-of-metabolism/>

The article provides an overview of the Metabolist architectural movement and traces the origins of Metabolism to a group of avant-garde architects who proposed radical solutions to urban planning challenges in postwar Japan.

Wendelken, C. (2000). Putting Metabolism Back in Place. The Making of a Radically Decontextualized Architecture in Japan. In *Anxious Modernisms. Experimentation in Postwar Architectural Culture*. Edited by S.W. Goldhagen and R. Legault. Cambridge, Massachusetts/London: MIT Press, 2000, pp. 279, 285.

This book challenges the conventional narrative that the two decades following the Second World War were merely a transition period between the decline of modernism and the rise of postmodernism in architecture. Instead, it highlights a lesser-known aspect of this era: the flourishing and evolving modernist movements that emerged during this time. The essays in this book delve into key themes of the postwar era, such as authenticity, place, individual freedom, and popular culture, shedding new light on modernist ideas and their enduring impact on architectural culture.

#### *Case studies:*

Bryant-Mole, B. (2018). *AD Classics: Tokyo Metropolitan Government Building / Kenzō Tange*.

ArchDaily.

<https://www.archdaily.com/793703/ad-classics-tokyo-metropolitan-government-building-kenzo-tange>

The article discusses the Tokyo Metropolitan Government Building, a significant architectural landmark designed by Kenzo Tange. The article explores the building's design and its structural features.

Fuji Television Network. (n.d.). *FUJI TELEVISION NETWORK, INC.* <https://www.fujitv.com/>

The website gives some detailed information about the design and history of the Fuji Television Building designed by Kenzo Tange.

Gardner, W. (2020). Liquid cities. *Places-a Forum Of Environmental Design*, 2020.

<https://doi.org/10.22269/200526>

The article "Liquid Cities" explores the dynamic and ever-changing nature of urban environments in the context of climate change and globalisation. It also discusses the role of Expo 70 as "the city of the future".

Hu, R., Pan, W., & Böck, T. (2020). Towards dynamic vertical urbanism. *International Journal Of Industrialized Construction*, 1(1), 34–47. <https://doi.org/10.29173/ijic208>

This paper proposes a new framework for vertical city development called "dynamic vertical urbanism." It emphasises constant vertical urban transformation through the use of advanced construction technologies. The paper also discusses the characteristics and principles of Metabolism.

López-César, I. (2019). *World Expos and architectonic structures. An intimate relationship*. Paris, France: Bureau International des Expositions.

<https://www.bie-paris.org/site/en/blog/entry/world-expos-and-architectonic-structures-an-intimate-relationship>

The article explores the close relationship between World Expos and architectonic structures throughout history. It highlights how World Expos have served as platforms for showcasing innovative architectural designs and technological advancements on a global scale. The article also reflects on the evolving role of architectonic structures in World Expos, from serving as exhibition spaces to embodying cultural and technological achievements. Overall, it underscores the significant impact of architectonic structures on the identity and memory of World Expos.

Pernice, R. (2004). Metabolism Reconsidered Its Role in the Architectural Context of the World. *Journal Of Asian Architecture And Building Engineering*, 3(2), 357–363.  
<https://doi.org/10.3130/jaabe.3.357>

The paper discusses the originality of the concepts developed by Metabolism members and the innovative design of their projects, which garnered attention from critics both in Japan and abroad. However, the paper suggests that many critics may have misunderstood or overlooked key aspects of the group's original theories.

Seraj, S. (2016). *Impress group headquarters for electronic and print media*.  
<https://dspace.bracu.ac.bd/xmlui/handle/10361/6552>

This paper discusses various headquarters for electronic and print media around the world, under which the Fuji Television Building. It highlights the different design aspects of the building, including the sky corridors and the spherical observation platform, and how the design prioritises openness and transparency.

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