The Interface Function of Complex Cultural Facilities

- The Visual Lightness and the Transparency Design Effect -

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Abstract: Entering into the 21st century, digital culture and the innovation of media technology have drastically changed our understanding of the concept of architectural environment. Increased availability of information made possible by technological advancement has, directly or indirectly, contributed to the development of space design, which, in turn, offers a possibility for a new paradigm in complex cultural facility. In the digital culture, the procedure of the immaterialism in the architecture design is developed differently. Given these fundamental changes, this study examines multiple functions of the complex cultural facility. Recently, the importance of the complex cultural center has been growing, as people's desire for cultural activities diversified. In order to effectively accommodate the general public's interests in various cultural activities, the complex cultural center tended to be multi-functional. At the same time, I argue that it is necessary to reexamine its functions in terms of how the multi-complex cultural center fits into the immaterial trends.

Keywords: complex cultural center, visual lightness, immaterial trend, transparency effect, multi-media

1. INTRODUCTION

The immaterial trend is the result of anti-modernism movement in the late 20th century and this trend has become so much apparent that many architects have engaged themselves in design that embodies transparent elements in complex cultural facility. The immaterial trend that attempts to incorporate the transparent design elements, such as glass and visual lightness has surged in the architectural space visually by layering and using the lighting technique. This study is about analyzing the cultural space and abstracting the transparent elements from the cultural facility design in Japan. Also, this study provides the description of the main use of each theater space, the data of each facility's equipment and the visual interface function.

2. TRANSPARECIES AND VISUAL LIGHTNESS

Attempts at combining material with glass and innovative design form often run the effect of visual lightness. While construction and surface detail elements are chosen for emphasis, other interior and architectural spaces are projected and overlapped. Those surface elements are reinterpreted and modified so that they can effectively accommodate in the interior environment. The overlapped space appearance and exclusion of architectural detail elements requires a deepened understanding as well as interpretation of the meaning of visual lightness. In this sense, complex cultural facility is involved in a subtle balancing act

between transparency and visual lightness in the spatial division. The transparent surface of the building resulted the visually overlapping space layout and the glass-wall in the building created the see-through architecture with the void space. And the function of this void space and the glass-structure developed as the epidermal system.

Specifically, this study examines how the contemporary space design and the transparency effect coexist and reinforce each other by giving the impression of the visual interface. For this study, I analysis the backgrounds of the Japanese complex cultural center design. In order to analysis the visual lightness phenomenon, this study investigates immaterial tendency in the complex cultural facility with the transparency effect, visual interface, complexity of structure and spatial division. Furthermore, I will illuminate how the elements of the transparent effect are incorporated into the contemporary space design. By examining the diverse examples of the complex cultural facility, this study aims to shed a new light into the relationships between the transparent materials, the hyper-surface expression and the visual lightness in the complex cultural facility. Based on concepts such as transparent materials, hyper-surface expression, visual lightness, which transcend the limitations of space and time, it explores new emerging trends for the cultural space design. Further more, to analysis the space communication and design features, I examine the descriptions of the each spatial function.

Table 1: Transparency and the Visual Lightness

Visual Transparency	Morphological Transparency
Literal lightness + Phenomenal lightness	Conceptual lightness + Cognitive lightness
Surface as Space Boundary	Structure as Space Data
Substancy	Topology
Minimal, Light	Media, Digital, Virtual Environment

3. COMPLEX CULTURAL FACILITY IN JAPAN[1]

The architectural history of cultural facilities in Japan begins with the public hall and auditoriums, which came into being in the early Meiji era. From the time of the Meiji Restoration in 1868, Japan has made a thoroughgoing effort to imbibe such Western culture and modernize itself. The concept that Westernization equals modernization and progress has been accepted not only in Japan but also in all developing nations.[2] In the nineteenth century were the first chairs introduced in Japan; eventually, all partitions were eliminated in favor of a western-type orchestra with only armchairs as seats in the house; however, some remaining *sajiki*[3] were retained with traditional *tatami*[4] for those spectators who prefer to sit in traditional style.

After the war when Japan was rebuilding the country and the entire infrastructure, and even later on, the interest of foreign architects in Japan was by and large limited to its traditional architecture. While

[1] Sunyoung, Kim, "Theater Design in Japan: Traditional Design Elements of The Contemporary Performance Facility", *Bulletin of the 5th Asian Design Conference*, 2001. 10. 11.

[2] Botond Bognar, ed., *New Architecture*, Number 3: *Japan At The Cutting Edge* (London: Andreas Papadakis Publisher, 1999), pp. 10-19.

[3] The sheltered side galleries in the early Kabuki theatre building.

[4] The traditional straw mats used in most Japanese homes as floor covering.

contemporary developments were regarded as remote curiosities-obscure phenomena that could work in Japan but would be largely irrelevant in the West.[5] During the decades or so after World War II, so-called assembly halls became popular as places for public gathering and established themselves as the central elements in a network of public facilities.

With theaters and concert halls, spatial elements such as the configuration of the spaces, acoustic effects, and the stage facilities are in general planned and designed to best suit the main function and the usage, and the spaces, technology and human resources are organized with the intent of creating a specific artistic environment. From the early days of its history, architecture of this type has primarily been in the domain of the private sector in Japan. In contrast to such private facilities serving specific purposes and managed under definite policies, most public facilities fell into the general category of multi-purpose halls. Cooperation among consultants and specialists in the related fields has now become more readily available, creating a situation in which more reliable designs can be implemented.

4. TRANSPARENCY EFFECT IN THE JAPANESE COMPLEX CULTURAL FACILITY

4.1. Tokyo International Exhibition Center

Built by the Tokyo Metropolitan Government, the Tokyo International Exhibition Center (commonly referred to Tokyo Big Sight) is Japan's largest exhibition oriented convention center. In 1985, Tokyo International Exhibition Center was constructed in Ariake, Koto-ku and leases the facilities to organizations, which host conventions, meetings and shows. In addition, we support and co-organize many of the shows. This center opened in 1996 and in 1997, Tokyo International Exhibition Center has housed a total of 11.5 million trade and public show visitors. This premier convention facility is for the international conferences and meetings and it offers a ideal setting for the exchange of information to the cutting of deals.

The Tokyo International Exhibition Center offers 230,000 square meters of floor space and is composed of three main areas such as the Tower Building, the East Hall and the West Hall. The Tower Building has conference rooms of a variety of sizes. The International Conference room is the largest with a seating capacity of 1,000 persons. It is equipped with a 250-inch high-definition video projector, sound and lighting equipment, a conferencing system, high-tech audio-visual system and simultaneous translation equipment that can handle up to eight languages. The main exhibition halls are located in the West Hall and the East Hall. The East Hall has six exhibition areas that flank the Galleria with three halls on each side and some of the halls can be converted into one large exhibition space. The two-tiered West Hall has four exhibition areas and is designed for smaller shows. An adjacent outdoor and rooftop exhibition area is also available for a wide range of events. In addition, Tokyo Big Sight offers a Reception Hall, meeting rooms, and an array of restaurants, lounges, shops, and food outlets.

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[7] Botond Bognar, “Between Reality and Fiction: Japanese Architecture in the 1990s or the New fin de Siecle,” in Andreas C. Papadakis, ed., *Architectural Design (AD): Japanese Architecture II* (London: Academy Group, 1992), p. 12.

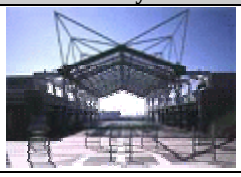
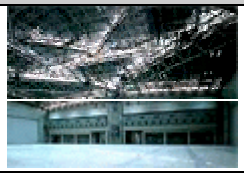
Tokyo International Exhibition Center			
			
Exterior View	Event Plaza	East Exhibition Hall	Entrance Hall

Fig. 1: Tokyo International Exhibition Center

Table 2: Building Specifications

Site Area	Building Area	Total Floor Area	Total Exhibition Area	Structure	Main Building
243,419.46m^2	141,700.04m^2	230,873.07m^2	80,660m^2	- Steel-frame - Reinforced Concrete Construction	- The Tower Building - West Exhibition Hall - East Exhibition Hall

Table 3: Tower Building Descriptions

No	Building	Descriptions
1	Tower Building	- Shaped in the form of an inverted pyramid, the Tower Building is an 8-story -58 meter high-structure with underground parking. - It houses the international conference room of a variety of sizes and a reception hall.

Table 4: Tower Building Space Descriptions

No	Space title	Descriptions
1	Reception Hall	- Suited for hosting parties, shows, symposia and a variety of other events. (The Hall can be divided into two separate halls.) - Equipped with a stage that can be raised and lowered. (Video projectors, audio and lighting control rooms.) - Equipped with simultaneous translating system for 8 languages.
2	Meeting Room	- Two meeting rooms located across the reception hall. - The meeting rooms can be used as conference rooms, receptions and parties. - A kitchenette situated next to the rooms handles catering services.
3	Conference Room (6th floor)	- Designed to accommodate a variety of set-ups. - The rooms are ideal for holding small-scale international conferences. - The space equipped with flexible audio-visual equipment. - The partitions between the rooms can be removed to create a large meeting area. - All rooms are equipped with simultaneous interpretations facilities for 4 languages.
4	International Conference Room (7th floor)	- This place accommodates 1,000 people. - The room equipped with a 250-inch high-definition video projector, the latest audio-visual and lighting systems. - This offers simultaneous interpretation for 8 languages. - It is equipped with a vote-counting system, speaker-monitoring system and roll-taking system.
5	Meeting Rooms (7th floor)	- In addition to the International Conference Room. - 17 additional conference rooms equipped with an audio-visual system.
6	Conference Meeting Rooms (8th floor)	- The Audio Visual Conference Room (Room 801) is suited for teleconferencing. - It is equipped with a 50-inch video projector and leading-edge audio-visual control panel. - A V-shaped table can seat up to 16 people. - Additional facilities include a conference room equipped with a round table that can seat up to 28 people.
7	Entrance Plaza	- The Entrance Plaza is the main access to the Exhibition Halls. - Located immediately on the left is the Event Plaza, with its glittering glass roof and the outdoor Exhibition Plaza. - The second floor Entrance Plaza leads to the exhibition halls; it is equipped with lounges, shops and information boards. - These sites are designed to host a wide range of outdoor events, from ceremonies, shows, entertainment, exhibitions to festivities.
8	Simultaneous Interpretation System	- Simultaneous interpretation equipment, for up to eight languages is available in the International Conference Room, the Reception Hall and Conference Room 605 to room608.

Table 5: East Exhibition Hall Descriptions

No	Building	Descriptions
1	East Exhibition Hall	- It is providing a total exhibition space of 26,010m^2 is a 3-story structure with three floors above ground and one underground parking lot. - The East Exhibition Hall consists of six halls, three on each side of the Galleria. - The halls on each side of the Galleria can be combined into one large exhibition area. - Each hall measures 90 m x 90 m and contains recessed electronic and information control service pits every six meters. - The mobile roof enables exhibitors to control the amount of natural light that flows into the halls. - Each hall is equipped with a show office, meeting room, dressing room and the large freight entrances to facilitate exhibition setup and removal.

Table 6: Space Descriptions

No	Space title	Descriptions
1	Galleria	- The Galleria is a two-tier 600meter long street with moving walkways. - This main corridor connects the exhibition halls on both sides is equipped with a glass roof enabling the penetration of natural light and sunshine. - The Galleria serves the dual purpose of easing movement within the East Hall and of providing rest areas and food outlets. - It is equipped with electronic signboards and a host of additional information communication facilities. - It is lined with restaurants, cafeterias, and shops. (Various escalators make access easy to both floors of the Galleria.)

Table 7: West Exhibition Hall Descriptions

No	Building	Descriptions
1	West Exhibition Hall	- West Exhibition Hall is suitable for small-scale exhibitions and event. - It is a two-tier structure that consists of four halls that surround the atrium. Both levels are equipped with freight entrances for smooth delivery and removal of exhibits. - The upper-levels offer an array of meeting rooms of various sizes and each hall is equipped with a show office.

Table 8: Space Descriptions

No	Space title	Descriptions
1	Atrium	- The Atrium is an indoor court located in the center of the West Hall. - It offers a spacious floor space of 5,800m^2 of which 2,000m^2 can be combined with the West Halls for additional exhibition space - It is enclosed with a glass roof from where natural light.
2	Outdoor Exhibition Area	- The Rooftop Exhibition Area is situated above the West Hall. And the Outdoor Exhibition Area is adjacent to the West Hall.

4.2. Tokyo International Forum

The Tokyo International Forum is Tokyo's first convention and art center and combined four buildings with 11 stories above ground and 3 below. The Tokyo International Forum has a magnificent venue embracing a glass atrium. Each building is housing a unique hall and especially the Glass Hall atrium is distinctive with the light effect, glass and the steel constructions. The glass with the steel constructions cast the variety of the shadow reflections and the lighting effect. Softly illuminated walls on either side of the interior area create a relaxed atmosphere for the entire hall.

Halls A through D, the Exhibition Hall, the Reception Hall and thirty four conference rooms hold to a wide variety of events. In addition, each of the refined spaces boasts the best equipment and facilities. Furthermore, every space is welcomed the handicapped people offering the restrooms, seating spaces, special elevators, and escalators. Wheelchair-lifting equipment have improved access for wheelchair-bound visitors. An audio system, raised pattern flooring tiles, braille maps, and chimes serve as guides for visually impaired visitors. Each hall is equipped with special facilities for those with hearing difficulties and the separate cloakroom available in each hall and parking lot on B3 accommodates 422 vehicles.

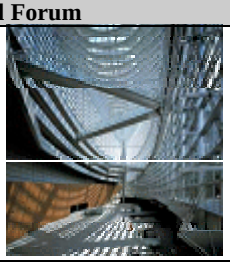
Tokyo International Forum			
			
Exterior View	Pedestrians bridges	Glass Hall-Daylight	Glass Hall-Nightlight

Fig. 2: Tokyo International Forum

Table 9: Space Descriptions

No	Space title	Descriptions
1	Hall A	- It is the largest of the Tokyo International Forum halls and comfortably seats 5,012 within its double-level theater-type structure. - The hall employs the most advanced equipment: simultaneous interpreting system for 8 languages / large 400-inch projector for high-definition TV. - The integration of events held in several locations is eased with the AV network. - The advanced audio equipment and stage systems are also suitable for musical performances, concerts and various stage events.
2	Hall B	- The hall is suitable for various events including international conferences, exhibitions and fashion shows. - This square multipurpose hall with side lengths of 38 meter features a stage and seating layout. - This space incorporates a highly versatile flat open space with a generous floor area of 1,400m^2. (Located on the 7th and 8th floors of B Block, this hall commands a magnificent view of the Imperial Palace grounds from a large window, which can be accessed by escalator). - A simultaneous interpreting system for 8 languages is installed in the hall. - The hall is equipped with a soundproof, movable divider for separating the venue into two sections.
3	Hall C	- It is designed to achieve the ideal acoustics for a music hall. (A space of only 35 meter separates the seating area and stage to create an air of intimacy between the audience and performers). - Seating is arranged in three levels with room for 1,502 people. - The special concert hall shaper acoustic baffles and acoustic field control equipment. (Control over reverberation timing to ensure the creation of the ideal sound characteristics for each function.) - The flexibility of space makes the hall suitable for a variety of events ranging from classical concerts and musical performance to international conferences. - The interior of the hall features a stylish color with walls made from Chinese quince, reminiscent of the wood used for violins.
4	Hall D	- It is designed offers limitless potential for new alternative forms of expression. (With a wealth of technological innovations, the entire hall can be used as a performance stage.) - Rollback seating provides optimum flexibility in design to allow users to fully express their creativity. (Interior decor is purposely low color scheme to create an ideal atmosphere for experimental theater.) - Trussed battens on the ceiling for attaching speakers and lighting equipment easily hold the weight of a person to smooth event preparation. - The hall incorporates acoustic field control and active field control. - The lighting equipment control with digital memory stores information for up to 1,000 lighting combinations.
5	Exhibition Hall	- Glass and granite walls with a ceiling height of 9 meter and double-level atrium design surround the space. (The Exhibition Hall encompasses a generous floor area of 5,000m^2.) - This unique hall provides the flexibility to meet a range of uses including exhibitions, industrial trade shows, official announcements and parties. - The interior of the hall is visible from the B1 concourse to provide a glimpse of exhibitions for passersby. - 2 seminar rooms are also available to support the use of the facility when it is separated into 2 areas.
6	Conference Rooms	- Each conference room is equipped with excellent facilities and can share sound and visual information with other conference rooms via our AV network. (The 34 conference rooms, comprising 30 conference rooms in the Glass Hall and four conference rooms in the hall buildings, are sized between 26m^2 and 285m^2.)

7	Reception Hall	- Refind Japanese style and futuristic design combine in the interior of this hall which features a large lobby and waiting room for hosts and guests of honor and the hall is ideal for a range of ceremonies. - An auxiliary kitchen is located to the side of the hall and can be used in combination with the main kitchen on B1 for various catering demands. - An ideal setting for parties, this hall can also be used as an additional forum in conjunction with events held in other halls.
8	G lounge (Glass Hall)	- Glass Hall is located on the 7th floor (224m^2) and the electrical capacity is 17KVA. - The lighting fixtures are the flat and wide type spotlights. -The he 6 lighting rail circuits (18A/circuit) and the electrical roll blind are built-in.
9	Plaza	- This area is approximately 9,700m^2. and is the place of recreation and relaxation area is full of rich green. - The plant a garden with 60 trees; 45 Zelkova, 15 Japanese Judas. - The floor finish is the granite placing PC boards on the float floor structure. (Floor load: 360kg/m^2)
10	Audiovisual Hall	- This hall is suitable for events such as film previews, seminars, and lecture meetings using audio-visual equipments.

4.3. Sendai Mediatechque

In January 2001, the multi-purpose public cultural center, Sendai Mediatheque, was opened in the city of Sendai, Japan. It is one of the defining buildings of our era and is a competition-winning scheme chosen from amongst 235 competing proposals. This stunning complex cultural facility accommodates variations of public arts and culture events. The building housed multimedia library, art gallery, audio-visual library, film studio, café, archive, studios and information center. The building's unpredictable physical structure generates chance encounters, connections and gatherings.

The Sendai Mediatheque's main design elements are the architectural formation, transparent surface and artificial lighting. Lighting effect provides an important aspect in the design and is essence to the appearance. In the day, the spaces are filled with diffused light from the outside while at night the entire structure is filled with light and the building glows invitingly and when not flooded by daylight, the structure glows artificially from within..

Having been originally inspired by the image of floating seaweed, thirteen steel tubular lattice structures penetrate the building design. The tubular lattice structures carry the weight of the 400mm thin floor slabs on each of seven floors and these structures are giving the building the impression of being suspended in mid-air. Floor plates set at irregular heights hang from a transparent latticework of structural seaweed-like tubes, which snake up through them while a translucent vertical skin hangs from the floor plates. The open plan is not intended to create homogeneity but differentiation with the few internal walls. Within the continuous space, subtle variations effected by the tubes stimulate a variety of activity. Through this the building moves beyond being a metaphor for architecture's connection to the city and becomes an active agent in the visual and cultural exchange.

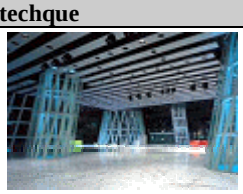
Sendai Mediatechque			
			
Exterior Surface	Interior Surface	Ventilation Structure	Meeting Room

Fig. 3: Sendai Mediatechque

Table 10: Space Descriptions

No	Space title	Descriptions
1	Meeting Room (2^{nd} floor)	- This space divided with the glass partition and set up with the multi-media system for meetings and the training programs. - Floor area is 48 ㎡ and donut-shaped conference table seats 20 people. - TV monitor, VCR deck and player, white board are set up
3	Gallery 3300/a, b, c (5^{th} floor)	- Exhibition spare for amateur artist - The area is divided with the fixed wall and total area is 970 ㎡(ceiling height is 3.3 meter) - The space is black paint on the pine wood flooring and white paint finish on the MDF wood wall covering with the fabric - Mobile spot lighting and fixed fluorescent light are used.
4	Gallery 4200/a, b (6^{th} floor)	- Exhibition space for media art to traditional format (Ceiling height is 4.2 meter and the area is 1,095 ㎡) - Movable pane system (66 units/4 meter long/load: 600kg/m^2) is using for partition wall - Distinctive elements are the floor finish is pine wood painting with white color, fire-proof fabric screen (20 meter wide), mobile spot-lighting and the railing track, louver system of ceiling, curtain for the tube
5	Meeting Room (7^{th} floor)	- This room is for the meeting and the conference such as media training - This space made up with a, b section and both areas can be unit by removing the partition. - Room A is 48 ㎡ and accommodates 20 people. / Room B is 50 ㎡
6	Cinema	- Area is 170 ㎡ and 180 seats (11 rows at the right-left side and the 12 rows in the middle section) - Up to the 3 tiers can be removed and the armrest can be folded 90 degree so wheel-chair pathway provided. - 3.7m/h x 7.7m/w screen is set up with the 35mm, 16mm projection system (5.1-channel Dolby Digital Audio System)
7	OpenSquare Space	- OpenSquare Space is multi-purpose space for movie, workshop, lecture and the performance. - The area is 460 ㎡ and receive 300 people: The area is constituted with 4 fixed walls (20 meter long) and movable wall and the ceiling height is 6.9meter. - The equipments are the translucent roll-up projection screen (12 meter wide and the 6 meter height) and the 400 inch high-luminance projector (12000 ansi lumens) - Movable panel (5 meter wide & 2.5tone) is soundproof construction and can cut off the 40 decibel. - Movable horizontal battens are set up on the ceiling and used for the screen and projector establishment
8	Childcare Room	-This area is 26 ㎡ and only for the children - The floor is wood flooring partially covered with Tadami mat.

5. CONCLUSION

In this study, I examined how Japanese complex cultural facility design promotes the use of transparent elements in search of new visual interface method. This design solution for the complex cultural facilities exemplifies the visual unification in architectural way. Recently, complex cultural centers are constantly engaged in a subtle balancing act between solid and void space. The design of contemporary cultural facilities in Japan best represents this trend in the sense that it incorporates lightweight elements into the essentials of Western modernist style, while stressing constant tension between the transparent and the opacity effect.

Tokyo International Exhibition Center building recovered the important aspect of public space with the highly distilled reminiscent elements of the building structure details. The steel latticework for the exterior form and the steel frame for the entrance monument are distinctive. This building is an exquisite building of delicate refinement replete with glass and steel pattern. These patterns are bold and made architecture more visually engaging by the combination use of natural lights in their geometric forms. The case of The Tokyo International Forum is representing the harmonious connection between the glass and the organic shape. The building is showing the sophisticated form and materials representing the combination of the transparent effect and the visual lightness in the art form. With the highly detailed construction and the accompanying

glass with the light effect, the whole interior atrium conveys the non-gravity space. Sendai Mediatechque is composed with the ecological aesthetics and the media environment. With the double glass skin, Sendai Mediatechque has a cylindrical, ventilation tube into which are inserted the wooden structures of the whole building. This ventilation tubular lattice system is the typical features of the whole building and the building possessed media-related rooms and every space is accessible for handicapped people.

The spatial construction of cultural center architecture is fully utilized in the design to create a comfortable and yet highly intense atmosphere. The three buildings rejuvenate the visual interface function by using the transparent material. These buildings result the arrangement to create an overall image of the combinations of transparent material and structure detail in highly exquisite level. Also these buildings execute the multi-function of the cultural facility, with comfortably diversifying dimensions and create the sequence of light effects in the interior space. Also the strictly proportioned elements of interior space, the refection of exterior walls with strong projecting interior elements are the distinguishing characteristic design elements. The asymmetrical slash of light effect, repetition of structure line visually creates the harmony of inside and outside the building. Otherwise, the architect actively used the natural surroundings to embrace into the building itself. The results are showing differently in each case but the essence of complex cultural facility could be found in its efforts to coalesce transparent material and visual lightness into the new category of the architectural design.

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