

A Study on the Expressive Characteristics of Interaction Design in Media-Facade

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Abstract - With the continuous change of urban information environment, the expression form suitable for building shell has also changed greatly. Architecture is increasingly media oriented, skin architecture is gradually becoming the focus, and media-facade is also gradually becoming a part of the city. Interaction Design, as a new strategy for the integration of architectural Design, plays a role in the media-facade to bring diversified development and different possibilities to the building skin. This study mainly focuses on the 'media-facade' and 'Expressive Characteristics of Interaction Design' of Seoul shopping mall. The Interaction Design performance characteristics of Media-facade are analyzed. The purpose of this study is to better understand the performance characteristics of Interaction Design in building skin, so as to apply it in practical design and explore a new direction in urban environmental design.

Keywords: Interaction Design, Digital Media, Media-facade, Building Skin

1. Introduction

Data on the current situation of domestic digital outdoor advertising sales from the KOSIS national statistical portal show that although the COVID-19 pandemic in 2020 had a huge impact on outdoor advertising sales, sales of outdoor advertising in 2021 also increased significantly as the economy recovered. Overall, sales in 2021 were up 9.6% from 2020. Outdoor advertising sales in Seoul accounted for 50.9% of the national total in 2021.[1] The building skin of shopping center is often integrated with digital media, interaction design and other means. As a media-facade, it is widely used in various marketing methods such as information transmission and advertising.

With the continuous change of urban information environment, the expression form suitable for building shell has also changed greatly. Architecture is increasingly media oriented, skin architecture is gradually becoming the focus, and media-facade is also gradually becoming a part of the city. Interaction Design, as a new strategy for the integration of architectural Design, plays a role in the media-facade to bring diversified development and different possibilities to the building skin.

This study takes the Media-facade of Seoul shopping mall as the research object to analyze the Interaction Design performance characteristics of the media-facade. As mentioned above, in order to propose the performance characteristics of Interaction Design in the media-facade of shopping malls, this study is roughly conducted from two aspects of 'Media-facade' and 'Expressive Characteristics of Interaction Design'. The Interaction Design performance characteristics of Media-facade are analyzed. The purpose of this study is to better understand the performance characteristics of Interaction Design in building skin, so as to apply it in practical design and explore a new direction in urban environmental design.

2. Theoretical Consideration

2.1. Development Trend of Building Skin

The building skin has multiple interpretations such as surface, skin, envelope, interface, and facade. The building gives people the most intuitive impression through its skin. From the rational facade of the ancient Greek era to the functionality of modern skin, from the symbolic and complex nature of postmodern skin to the multiple meanings of today's

architectural skin[2], the status of skin in building is constantly evolving. Jin XianJi et al.(2019) summarized as shown in Figure 1.

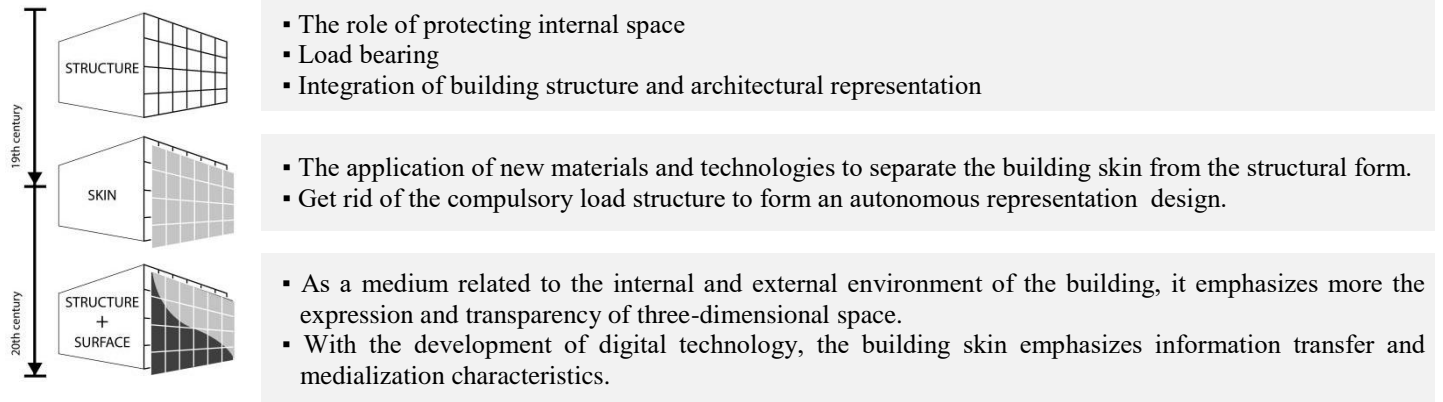


Fig. 1: Development Trend of Building Skin(Jin XianJi et al., 2019).

In the early days, in addition to the role of surrounding the space, the building skin could bear or support the weight of the roof.[3] During the industrial revolution of the 19th century, modern materials were applied to the building skin, and a new architectural aesthetic concept about building skin was formed. With the rapid development of modern science and technology, many new materials have appeared, and many digital technologies have been added to the building skin to make the space more three-dimensional or transparent.

In this regard, the skin of the building can be defined as the property that contains the meaning of overall communication, meaning overall communication. In addition, the skin of modern architecture, which is closely related to media environment and image culture, has been greatly influenced by globalization, informatization and consumer culture.

2.2. The Characteristics of Digital Media Facade

Compared with the previous media, digital media has changed a lot. It has undergone many changes as shown in Table 1.[4] Digital media is a single processing mode of different types of sensory information and digital signals, and a comprehensive processing, transmission and display of the media. The media technology that creates human and new surface can be interpreted as a mechanical and physical means of information transmission and communication while providing a variety of emotional images that stimulate the five senses of human beings.

Table 1: Development Trend Of Media Concept Changes.

Times	Changes of Concept	Type of Information
Early 1980s New media	It refers to the media form of conveying information in a new way and collecting, processing, transmitting and distributing information in combination with various computer technologies.	-Mobile Media -Digital Television -Internet New Media
Late 1980s Multi media	It refers to the media or media environment that can combine heterogeneous information forms such as image, voice, text and so on into one and process them into one.	-Text -Image - Animation -Sound - Video
Early 1990s Digital media	It refers to the information media which is based on the technology innovation of compression, transmission and storage and can deliver more information in a more timely manner than existing methods.	-Digital sensory media -Representation Media -Physical media: storage, transmission, display of logical media

As this medium grows, media facades become part of the urban environment. From prior research on the properties of architectural shells and digital media, Jang JaeWon et al.(2007) divided the characteristics of digital media tendency into information input directivity, organic representation and perceptual representation; Nam YoungHo et al.(2008) classified the properties acting on the active epidermis into information transmission, interaction and translucency; Oh SangMin et al.(2010) divided the media performance characteristics of architectural shell into information, interaction, integration and screen (super skin) characteristics; Kim JinYoung et al.(2010) divided the characteristics of media facade into interaction, timeliness and objectification; Tai InSung(2012) divided the facade performance characteristics of the building shell into bidirectional information and interaction, light, movement and time, and sneaker performance. Therefore, the performance characteristics of media-facade can be sorted into Information Directivity, Object, Timeliness and Interaction.

Table 2: Digital Media Characteristics of Architectural Surface.

Characteristics		Contents
Information Directivity	Unidirectional	Unidirectional representation can be transmitted to humans, and has the property of intuitive perception.
	Bidirectional	Bidirectional representation is the communication between human beings, which has the perceptual characteristics of intuitive or non-intuitive cognition.
Object	Landmark	The objectified representation of the digital media of the building skin can become a landmark, and the media representation can enhance the possibility of connection with the surrounding environment.
Timeliness	Transparency	When the transparent media building skin is wrapped, the information contained will be displayed in screen, and the building skin will change with time. The building skin can reduce the sense of distance between people and the environment, and their own changes can make the expression more diverse.
	Light / natural change	
Interaction	Organism representation	The positive interaction between the media, human beings and the environment will stimulate the sensory perspective of human beings; or the building skin will respond to changes in the surrounding environment, reflecting the interaction with humans.
	Sensibility	

2.3. Concept Of Interaction Design

Interaction Design is a Design field that defines and designs the behavior of man-made systems. It defines the content and structure of communication between two or more interacting individuals, so that they can cooperate with each other to achieve a certain goal. Interaction designs strives to create and establish meaningful relationships between people and products and services, centering on embedding information technology in the material world full of social complexity. The goal of interactive system designs can be analyzed from two levels of ‘usability’ and ‘user experience’, focusing on people-oriented user needs.[5]

Richard Buchanan of Carnegie Mellon University in the United States described the interaction design in four types as follows.[6] First, the interface is a person to thing interaction between a person and an object corresponding to the interaction of this step. Second, symbols and meanings are person to person interactions, which are important elements of the composition and interpretation of interactions. Third, determining human characteristics and culture/natural environment through human interaction is human to environment interaction. Fourth, referring to the human mental world, what was summarized as the stage of participation was classified and explained as the stage of human tocos interaction between humans and the universe. These types of interaction design have four characteristics: interface, transaction, human interaction, and participation.



Fig. 2: Types Of Interaction Design.

Meanwhile, Dan Safer defined the expression characteristics of the interaction design by dividing them into six types: movement, space, time, appearance, texture, and sound.[7]

Table 3: The characteristics of Dan Safer's interaction design.

Element	Characteristics of interaction design.
Motion	People behave according to the way the product behaves. Without movement, there is no interaction. All actions are movements, and movements appear differently depending on attitude, culture, personal characteristics, and situation.
Space	All interactions take place in space and proceed.
Time	All interactions take time in space. It can be very short or long.
Appearance	It provides affordance to know how to use the doorknob.
Texture	When held in hand, it provides clues about how to use it.
Sound	Sound is modified to suit the interaction design using devices such as Mixing Board.

2.4. Characteristics of Interaction Design

From the prior research on the performance characteristics of Interaction Design, it is sorted out in Table 4. Kang SungJoong & Lee BoIm(2011) sorted out the interactive design features of public space based on social media into social relationships, User experience and communication, Experience and sensibility of creating space, expanding user participation, etc. Kim HyunJi & Moon JeongMin(2012) sorted out the interactive design features of corporate publicity hall into Motion, Space, Appearance and Texture. Hwang ChaeHyun & Mo JungHyun(2014) sorted out the interactive design features of residential space into Physical, Entertainment, Emotional and Functional from the perspective of user experience. In addition, Kim KyoungTae & Han HaeRyon(2016), Hyun-Sik Shin(2018), un-geol Kim(2019) and others take exhibition space as the research object, The interactive design features are sorted into cognition, composition, complexity, individuality, etc.

Table 4: Consideration Of Previous Studies On Interaction Design Characteristics.

	Author	Contents
1	Kang SungJoong, Lee BoIm(2011)	Forming social relationships, User experience and communication, Experience and sensibility of creating space, Form a spatial identity, Provide the necessary information, Landscape of difference, Expand user participation
2	Kim HyunJi, Moon JeongMin(2012)	Motion, Space, Appearance, Texture
3	Hwang ChaeHyun, Mo JungHyun(2014)	Physical, Entertainment, Emotional, Functional
4	Kim KyoungTae, Han HaeRyon(2016)	cognition, composition, complexity, individuality
5	Shin HyunSik(2018)	Space, Story, Individuality, Formation, Complexity
6	Kim UnGeol(2019)	Physical, Cognitive, Content, Systematic, Interactive

In the pilot study, the performance factors used by the performance characteristics of Interaction Design are collected and sorted out in Table 5 below. The frequently mentioned performance factors and key words representing the theme in the previous research were collected, and four factors including Cognition, Space, Time and Appearance were extracted.

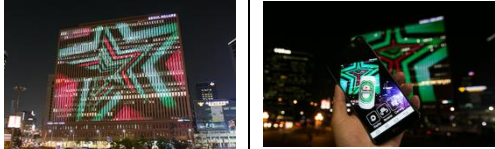

Table 5: Interaction Design Characteristics.


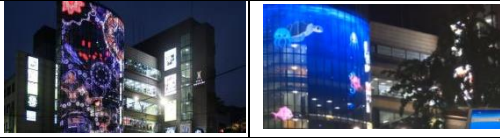
Characteristic	Sortation	Contents
Cognition	Through the interaction of cognitive processes and physical activity.	- Induce behavior moving line (experience moving line) - Media panel and simulation panel - Multiple behavior design, behavior guidance features
Space	Everything interacts in space.	- Digital Space (ex. Media Arts Performance) - Experience space, action space, function space - Guide action by moving lines - Spatial connectivity, social communication and sharing,
Time	The temporal nature of interaction through experience	- Experience time, action time, performance time - Integration of genres such as culture and art - Leaving the boundaries of physical space - A combination of entertainment and experience
Appearance	Visual interaction of the appearance	- Display experience through screen appearance - Induced operation of the form, behavior induced design - Appearance and panel composition that induce intellectual behavior - Screen, information transmission media

3. Methodology

This study selected shopping malls built between 30,000m² and 500,000m² in Seoul between 2013 and 2015 as the research subjects. Four shopping malls in Seoul were selected as the research subjects to analyze the media facades of shopping malls and observe the performance characteristics of interactive design. Likert 5 scale analysis was conducted as follows Table 6. (1: None - 5: Strong)

Table 6: Case Analysis Content.

Interaction Design Characteristics		(1: None - 5: Strong)					
	Area	132,806m ²	Scale	B2-23F	Construction	2009	
	Project	Heineken Visual Art			Year	2014	
	Type	Person to thing Interaction					
Case-A : Seoul Square		Location	416 Hangang-daero, Jung-gu, Seoul				
Cognition	The visual effect of media-facade attracts the attention of pedestrians and guides the experience route. As a new means of publicity, it promotes the interaction with people.						5
Space	Break away from the boundaries of physical space, show the connection with virtual space, improve social communication and sharing.						5
Time	The user experience-centered experience interacts with the media-facade to build a lasting environment.						4
Appearance	Media-facades that induce operations constitute facades and panels that have no physical boundaries and can be easily found.						4
You can overlap the virtual Heineken NEW CAN with the Seoul Square Media Facade that you can see with your eyes through a smartphone.							
	Area	25,000m ²	Scale	B1-6F	Construction	1994	
	Project	'City of Color' Digifen Art Show			Year	2019	

		Type	Person to thing Interaction				
Case-B : Yongsan Electronic Land		Location	74, Cheongpa-ro, Yongsan-gu, Seoul				
Cognition	Using multiple mobile devices for interactive activities, the content is through the works of designers or games to interact with people.						3
Space	Create an experience space without physical boundaries through media art performance.						4
Time	The integration of culture, art and other genres builds content that users can stay with for a long time through operation experience.						2
Appearance	Create a virtual display experience through a screen-like appearance.						5
By changing the color to the desired color through the tablet, it introduced a new method of media art using media facade.							
		Area	23,318㎡	Scale	B1-5F	Construction	2004
		Project	Right! SIGN			Year	2019
		Type	Human to environment interaction				
Case-C : Apgujeong Galleria		Location	343, Apgujeong-ro, Gangnam-gu, Seoul				
Cognition	On the media-facade, the colored light that visualizes the alarm is extinguished to convey the danger of fine dust to pedestrians and reflect the interaction between the media-facade and the environment and people.						4
Space	Enhance social communication and sharing with the urban environment through visual communication.						4
Time	The temporal nature of visual responses evoked by dynamic effects is minimal.						2
Appearance	The screen media-facade is composed of the communication media of information.						5
It arouses people's awareness of environmental pollution and conveys the risk of fine dust and the importance of wearing a mask.							
		Area	11,660㎡	Scale	B3-7F	Construction	2009
		Project	Game interaction			Year	2020
		Type	Person to thing Interaction				
Case-D : MyungBo Art Hall		Location	47 Marlinae-ro, Jung-gu, Seoul				
Cognition	The interactive content of multiple mobile devices is utilized on the large Display screen to attract the footsteps and attention of pedestrians.						5
Space	By creating virtual experience Spaces that transcend physical boundaries to express connectivity and enhance social communication and sharing.						5
Time	The combination of entertainment and experience is achieved through media-facade and tablet, with the creation of user experience as the center, enabling pedestrians to stay for a long time.						4
Appearance	The content of inducing operation constitutes the appearance and panel of inducing pedestrian action.						5
By expanding the media facade to the screen, various interaction activities such as game apps and writing letters are performed through tablet PC.							

The case analysis results are shown in the Figure 3 below, in which the Appearance feature is the highest at 4.75, followed by Cognition feature 4.5, Time feature 3.75, and Space feature 3.5.

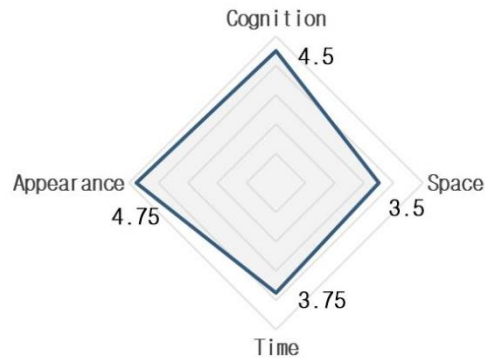


Fig. 3: Analysis graphics.

3. Conclusion

Combined with digital media and interactive design, the architectural facade of modern shopping center is widely used as a marketing method such as information transmission and advertising. Through literature analysis, this study sorted out the performance characteristics of Interaction Design into four characteristics: cognition, space, timeliness and appearance. This study takes the media-facade of four Shopping malls in Seoul as the research object to analyze the content of Interaction Design performance characteristics. The analysis results are summarized as follows.

First, the cognitive characteristics of Interaction Design are shown as interactions through cognitive processes and physical activities. The visual effect of the media-facade not only attracts the attention of pedestrians, but also guides the experience route. As a new means of publicity, the interactive content of multiple mobile devices is utilized to improve the interaction with people. In addition, the screen of the building skin is also a media function to convey a variety of information to pedestrians.

Secondly, the spatial characteristics of Interaction Design are the connectivity of virtual Spaces separated from physical boundaries, which is manifested by the Interaction with the media-facade. Get rid of the boundaries of physical space, show the connection with virtual space, create virtual experience space through media content, and improve social communication and sharing with the urban environment. The exterior of a modern shopping mall has become a more active exterior due to the combination of atypical objects and media due to the extensive use of information transmission and complex technological elements.

Thirdly, the temporal characteristics of Interaction Design are reflected through the Interaction of user experience. Over time, in creating user-centric experiences, entertaining and experiencing media content simultaneously across multiple mobile devices. The media facade is a fusion of culture, art and other genres, expressed through the interaction of the user's work. In addition, the information contained in the transparent media shell is being screened, and as the natural light changes, the building itself changes to reveal more performance to people.

Fourthly, the appearance characteristic of Interaction Design is the Interaction through vision. The on-screen media-facade consists of the communication media of the information, presenting the appearance features that can be easily found without physical boundaries. The screen skin can create a variety of media experiences, information transmission, action induction and other content. In addition, by changing dynamic images and images, people are stimulated to convey information from the perceptual perspective and highlight the perceptual atmosphere of the surrounding environment, which is manifested as perceptual tendency.

This study focuses on the case of media facade based on building skin, but it still needs to supplement the analysis of all relevant aspects in the future research, and has high hopes for the expression changes and technical development of digital media applied to modern building skin.

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