

# A PRELIMINARY EVALUATION SYSTEM FOR THE FACIAL AESTHETICS OF THE BUILDING FACADES USING COLORFUL MATERIALS

<sup>1</sup>JAE-HYANG KIM, <sup>2</sup>SEUNG-HOON HAN

School of Architecture, Chonnam National University, Korea  
E-mail: <sup>1</sup>gcna5128@naver.com, <sup>2</sup>hshoon@jnu.ac.kr

**Abstract-** The purpose of this study is to suggest integrated estimation factors for the facial aesthetics of the building façades using colorful material like wall panels, windows, the dye-sensitized solar cells (DSC), and so on. This paper is classified with two large categories for evaluation criteria: Structural and Non-structural. This approach will be used to evaluate the existing buildings more objectively. For this study, we have researched precedents study and reconstructed contents. These contents will later become more quantitative and objective data expressing the architectural beauty through such studies as AHP technique. In order to carry this research, the process of replacing the integrated design elements with the architectural elements and sorting them was done. For this, we refer to ‘Design Basics’ Lauer David A. and Pentak Stephen’s. As a result, the proposed system will be considered as an overall factor for expressing architectural Aesthetics in the architectural design stage.

**Index Terms-** Architectural Facial Aesthetics, Architecture Design, Façade, Evaluation Factor

## I. INTRODUCTION

Currently, studies on the analysis and evaluation of the façade design decision factors for commercial buildings are ongoing in Korea, but researches in other categories are underway. Also, these studies are merely evaluating existing buildings and do not show the importance of each factor to have aesthetic in the architectural design stage. Although the analysis of the importance of elements of architectural elevation in urban context was conducted as in the study of Sun-Pyo Hong (2013), each element was either too comprehensive or abstract.

In the above study, the façade has the highest ranking in architectural aspect, but it can not be judged what is good façade. Because the elements of façade are related to Shape, Proportion, Scale, Color and so on. Therefore, it is the goal of this research to create a direct evaluation index for these façades so that they can be used in the architectural design stage.

## II. METHOD OF RESEARCH

### A. Research Process

In the previous research, it was confirmed that the elements of the architectural elevation can be divided into the primary element(structure element) and the secondary element(non-structure element), (2003, Kyung-Ae Jeong). However, elements of each category were insufficient to evaluate the architectural façade and needed a more systematic category.

Type	Element	Importance	Ranking
Architectural Aspect	Façade	0.1483	1
	Shape	0.1482	2
	Proportion	0.1440	3
	Scale	0.1371	4

Physical Context	Artificial Element	Color	0.1111	5
		Size	0.0906	6
Physical Context	Urban Aspect	Building	0.2325	1
		Open Space	0.1788	2
		Skyline(Buildings)	0.1611	3
		Road	0.1261	4
		Facility	0.1090	5
	Natural Factor	Scene	0.2062	1
		Topography	0.1719	2
		Waterfront	0.1631	3
		Surrounding Color	0.1491	4
		Skyline(Nature)	0.1229	5
Non-Physical Context	Place Castle	0.1559	1	
	Locality	0.1467	2	
	Legal condition	0.1299	3	
	Continuity	0.1298	4	
	Openness	0.1270	5	
	Historical castle	0.1208	6	

Figure 1. AHP, Determination and Comparison of Cognitive Priority for Building Elevation within Urban Context (Source: S. Hong, 2013)

So we went through the process of redefining this category by replacing the terms of Lauer David A. and Pentak Stephen’s ‘Design Basics’ with architectural terms. The evaluation factor of the architectural elevation progressed through the steps shown in Figure 2.

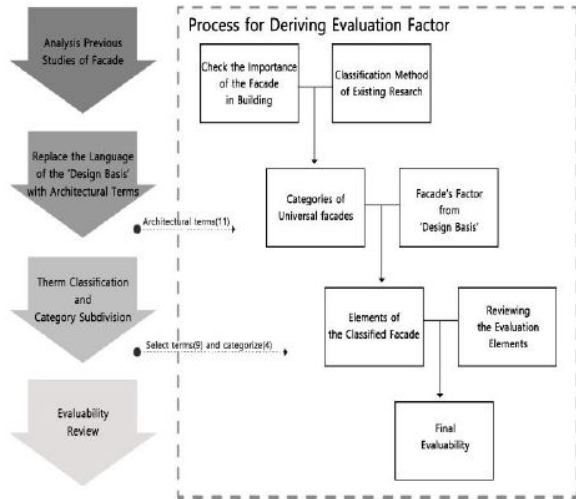


Figure 2. Process for Deriving Evaluation Factor

- 1) First step : Analyzing the previous studies of Façade with classification Method.
- 2) Second step : Elements of elevation from the language of 'Design Basics' book are extracted and classified.
- 3) Third step : Select 9 terms and categorize into 4. Reviewing the evaluation elements.

**B. Modern and Contemporary Building in Korea**

As Korea underwent the Korean War, modern architecture increased sharply. In this process, unique characteristics of Korean architecture are revealed, and they can be classified according to each facility. In the residential facilities, high-rise apartments have emerged, and in the commercial and office facilities, a universal space such as domino system has emerged.



Figure 3. Korean modern architecture

The characteristic of Korean modern architecture is that it emphasizes efficiency, which characterizes highly stacked apartments and signs. And these features have had a great impact on the façade design.

**III. EVALUATION FACTOR FOR THE FACIAL AESTHETICS**

**A. Selection of Façade Decision Elements**

In order to extract design decision factors, we used the term 'Design Basics'. In the 'Design Basics', design elements are defined as unity, emphasis/focus, balance, scale/proportion, rhythm, line, form/volume, texture, space and illusion, contemporary and illusion,

brightness and color. These elements were replaced by architectural elements as follows.

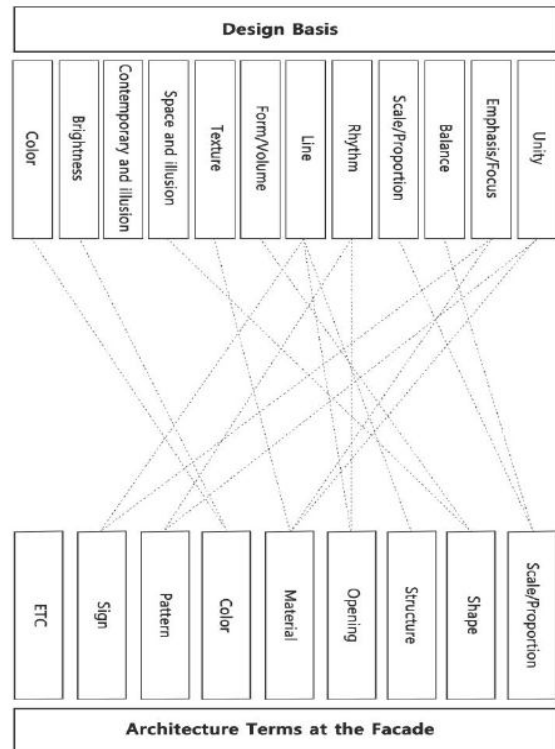


Figure 4. Design Basics-architecture terms at the façade

**B. Elements of Classified Façade**

Each architecture term was classified. Prior to classification, we added an element called energy facilities that is emerging at present. In addition, the characteristics of the material appearing on the elevation are indicated by the finishing material, and the term finishing material is used.

The large classification proceeded with the primary element(structure element) and the secondary element(non-structure element) used in the previous study, (2003, Kyung-Ae Jeong). Nine terms extracted prior to this category were arranged and subdivision was carried out according to the personality.



Figure 5. Energy facilities used in buildings

Type	Factor	Composition	Importance
Primary Element	Molding Factor	Scale/Proportion	
		Shape	

t	non-Molding Factor	Structural beauty	
		Opening	
Secondary Element	Aesthetic Factor	Finishing Material	
		Color	
		Pattern	
	Functional Factor	Sign	
		Energy Facility	

Figure 6. Components of Façade Table

Although we did not ask for the importance of this study, we can see what factors influence the aesthetics of the façade, if we use the AHP technique.

**C. Evaluability Review**

It is necessary to proceed with a review of the evaluability to evaluate the elements categorized above. For this reason, we reviewed the process of making a simple question for assessment and assigning a score to each factor.

Scale can not be directly assessed, but it can serve as a category for building evaluation. However, if the ratio is a pre-preference survey ratio, it will be easy to set the score later when evaluating buildings. The shape can be evaluated through the following questions; ‘Does the building have a unique shape?’, ‘Does the shape and function match?’, ‘Does the shape express symbolism?’, ‘Is the skyline appropriate?’, etc. In the case of structural beauty, the following questions can be expected; ‘Has the repeating structure been reflected in the elevation?’, ‘Does it bring a three-dimensional sound effect by light?(such as Lyon Airport Train Station)’ etc. The opening can be pre-determined according to the shape; basic, vertical, horizontal, curtain wall, irregular type, etc. In the case of finishing materials, it can be evaluated through the material compatibility with the materials and the surrounding environment. The colors can be evaluated according to the image of the city and the degree of adaptation of the cast color and highlight color. Patterns will be able to create evaluation questions based on the size or shape of the pattern. signs can also be used to create evaluation questions about form, color and lighting. Finally, the energy facilities will be

assessed according to the method and for of adaptation to the building.

**CONCLUSION**

The purpose of this study is to systematize the aesthetic evaluation index in the building façade. Therefore, it is necessary to finely divide the elements of the building façade. In order to derive the elements that determine the façade design, we use the book ‘Design Basics’ and systematize the inferred design factors. However, this study did not determine the importance, which can be followed by such as the AHP technique. The evaluation of these factors was evaluated, but the development of the actual evaluation questionnaire did not proceed. This study will be conducted after the importance has been determined, and will be used as a tool to evaluate buildings by proceeding with quantification through questioning.

**ACKNOWLEDGMENTS**

This research was supported by a grant from Land and Transport Technology Promotion Research Program (Implementation of Building Façade Modules Based on Colorful Semi-transparent Solar Cells towards Urban Surroundings) funded by Ministry of Land and Transport Affairs of Korean Government (Project No.: 17CTAP-C129910-01).

**REFERENCES**

- [1] Sun-Pyo Hong 2013, Determination and Comparison of Cognitive Priority for Building Elevation within Urban Context
- [2] Yeon-Soon Oh 2009, A Study on the Composition Patterns of Façade For Buildings.
- [3] Kyung-Ae Jeong 2003, A Study on the analysis of relationships between façades and signs in commercial buildings
- [4] Dong-Hi Oh 1984, A Study on the architectural elements on street environment and its spatial form
- [5] Jae-Won Go 2010, A Study on the Repetition of the Surface in Contemporary Architecture
- [6] Ji-Young Seo 2011, Typological Analysis on the Façade of Commercial Buildings –Case Study of Jinju Newly Developed District-
- [7] Lauer, David A., Pentk, Stephen 2007, Design Basics
- [8] Kyung-Jin Kim 2003, A Study on the Symbolic Relationship between the Function and the Form in Organic Functionalism
- [9] Jeong-Hyun Kam 2009, A Study on the Structural Aesthetics in Architecture of the Santiago Calatrava

