

Comparing Building Exteriors Design Perception Regarding the Integration in an Urban Preservation Area

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Abstract—The purpose of this paper is to deepen understanding of the variables working in the perception process of a newly integrated building in an urban heritage area. The paper examines user's perceptions of the newly designed building façades from the angle of insertion in its environment. We tried to understand how physical features impact on perception of building insertion quality.

On that purpose, we conducted a survey on architecture students familiar with the site. The analyses of the research-helped de highlight relevant variable when designing a new building in an urban heritage area.

This article reviews formal and symbolic variables in order to find out the correlation with the evaluative Responses. We scope our research regarding the insertion of a building in an urban heritage area and we focus in especially with the building exteriors in the mean of producing design recommendation based on aesthetic variables.

Index Terms—Integration, perceptual study, urban heritage area, façade design.

I. INTRODUCTION

Through the last decades, our view on urban heritage preservation has drastically changed. This increase of interest is strongly related to social, environmental and economic variables, and aims to sustain preservation areas regarding those criteria. On that purpose, government around the world set up a set of regulation laws to encourage investment in preservation areas. While most of research in this field questions the intervention on existing buildings in preservation areas, few of them focus in on the insertion of a new building in an urban preservation area, mainly due to the lack of this kind of opportunities. It will be interesting to research this field, as it is a legit part of urban heritage preservation policies throughout the different existing policies.

This research paper will focus in urban preservation area in rural towns in Japan, and takes as experiment area Hizen Hamashuku, Kashima, Saga. The raising interest of the inhabitants in their heritage in the last years drove the government to develop a master plan for the regeneration of this area. The result was the designation of Hizen hamashuku as a “preservation area of traditional buildings” in 2007. Local town with thatched houses and tile-roofed houses standing in a row and brewery town with sake factories (Sakagura) and houses covered in mud characterize the area, although the architectural styles have been changed with the times. More recently, thanks to preservation efforts, Kashima

city came up with “sake brewery tourism” with an expected success. Nowadays, sake tradition still inherent to the new generation, urging people to invest in new project in the area. [1]

In the context of design of a new project in this area, three design proposals were suggested following different approaches and design teams took care of the importance of insertion in the site. The projects have to preserve the authenticity atmosphere of the site to get the approval of city authority but as new projects they can match with the standard of townscaping and has to use local traditional architectural language. Also as commercial projects they have to be welcoming and appealing for clients to match with the owner recommendations.

Comparing those three design proposals from the angle of perceptual view helped to select a set of relevant variables to pay attention to while designing a new project in an urban heritage area, in a Japanese rural town.

II. SITE ANALYSIS

Kashima is a rural city bound by the sea to the east and forested mountains to the west. From the early nineties, local residents became interested in revitalizing the area and worked to gain the support of Bunkacho¹. As a result, Bunkacho began a survey of the city's traditional buildings in 1996 which led to the development of a masterplan for the regeneration of the area.

In 2007, two areas of Hizenhama are designated as «traditional buildings preservation districts»², Hamashozumachi-Hamakanayamachi district in the south of hamagawa river and Hamanakamachi-happongishuku district in the north (Fig. 1). The first is related to the preservation of traditional thatched properties and the second contains an area of historic Sakagura (sake breweries). During the Edo period³, this area was a station where travelers could enjoy services such as accommodation, refreshment.

Nowadays, the interest for the area is reviving by new investment in sake brewery. For these new projects the government offer subsidies and as counterpart, conditions can be imposed to respect the traditional atmosphere of the city (Pottier 1995).

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1 Japanese Agency for Cultural Affairs

2 伝統的建造物群保存地区 dent ōteki kenz ōbutsugun hozon chiku

3 Edo period 1603 – 1868

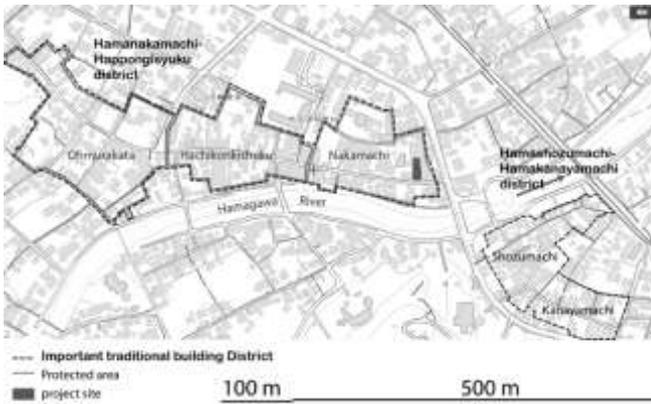


Fig. 1. Hizenhamashuku preservation districts and areas.



Fig. 2. Position of the project site on sakagura dori.



Fig. 3. The site and its environment.

In Hamanakamachi-happongishuku district there are three protected area: Nakamachi with many building from showa period⁴, Hachihonkishuku (Edo, Meiji) and Ohmurakata (various era)

The project site is in Nakamachi overlooking the sakagura dori (Fig. 2) and its environment is mainly composed of story houses from Showa era. Previously hosting a thatched house, it is now it is a wasteland. (Fig. 3).

III. LITERATURE REVIEW ON URBAN DESIGN AESTHETIC EVALUATION

In dealing with the public appearance of buildings, design review should attempt to control the visual character for the public good. This aim fits with the way psychologists have operationalized aesthetic response. They define aesthetic response as favorable emotional appraisals or evaluations [2],

[3].

The pursuit of enjoyable surroundings does not imply uniform design criteria to make all buildings and places pleasant. Evaluative response has been found to consist of three components: pleasantness, excitement, and calmness. [4]-[6]

The aesthetic response results from an ongoing interaction between active humans and their environment. It may vary with biology, personality, social and cultural experience, goals, expectations, associations, internal constructs, and environmental actors [7]-[9], but, it also has some commonalities across individuals.

Two kinds of building features are relevant for urban design aesthetics: those that relate to the structure of forms for their own sake called thereafter formal aesthetics, and those that are relate to content of forms called thereafter symbolic aesthetics. [10]

Attributes of formal aesthetics include shape, proportion, rhythm, scale, complexity, color, illumination, shadowing, order, hierarchy, spatial relations, incongruity, ambiguity, surprise, and novelty. [10]-[12]

Concerning symbolic aesthetics, humans experience building exteriors through mediating content variables. These variables relate to but are not defined solely by physical attributes. These content variables reflect the individual's internal representation of the building and meanings associated with that representation and building.

According to Norberg-Schulz [13], when we first experience an example of a particular formal structure, it stands alone and lacks meaning as a formal structure. As we experience and interact with other examples of the same or similar formal structures, we categorize them internally in terms of similarities and dissimilarities. The probability that we will recognize a formal structure as a style depends on two things: the frequency with which we have encountered various formal structures and the degree to which the building has the probable attributes and relations of the style.

Of the formal variables that researchers consider as relevant to aesthetic response [14]-[17] several have emerged as prominent in humans' experience with their physical surroundings [6], [18]-[24]. They include

- Enclosure (openness, spaciousness, density, mystery)
- Complexity (diversity, visual richness, ornamentation, information rate)
- Order (unity, order, clarity).

The research on enclosure and related variables suggests that people prefer defined open space to wide open spaces or highly enclosed spaces [25], [26]. However, other variables relating to the surface and shape of buildings have more relevance to design review than do these spatial variables.

Complexity involves a comparison in which more independent elements, larger difference between them, and less redundancy and pattern produce greater complexity.

Order refers to the degree to which a scene hangs together or makes sense. [25]

An individual's experience of a building depends on an interaction between its features and the individual's knowledge structures of experience related to the particular class of building. Through interacting with the environment and developing knowledge structures, individuals from different places, cultures, and subcultures would develop

⁴ Showa period 1926-198

different meanings and preferences across content (or symbolic) categories. Several content variables have emerged as salient in humans' experience of their environment [6], [18]-[24]. These variables include:

- Naturalness
- Upkeep
- Intensity of use
- Style

As an alternative to using general principals gleaned from research findings, design review could use aesthetic programming to develop guidelines for specific situations. Aesthetic programming would involve the applied study of visual qualities desired for the particular context and population under question. The programmer would investigate, develop, gather, and organize information to produce an aesthetic program.

IV. RESEARCH METHODOLOGY

A. Site Specification

The site was a wasteland when the project was designed but, there used to be a thatched house in the site, the environment of the site is essentially composed of store houses or “Dozo-dukuri”. These store houses use different language elements related to different eras. There are other styles existing in Hizenhamashuku. Those traditional style of architecture can be integrated in the project design.

In addition, other factors had to be considered. Several stakeholders took part on the design such as the owner and city authorities. They brought additional criteria and design teams had to consider demands related to the commercial function of the project, like an appealing entrance or an outstanding architecture. They needed to conciliate between those requests with other consideration related to the site.

B. Schematics of Design

Three design proposal was suggested based on the site specifications.

C. History Approach

The design of a “Kudo-dukuri” was retained for this approach. This U-shape building still be one of the traditional style existing in japan. Usually the Flat part of the U-shape is overlooking the street (Fig. 4), but the design team reversed the classic orientation to have a welcoming entrance more convenient for business (Fig. 5). The roof shape is similar to a thatched house roof and meshes in the urban historic environment.

D. Environment Approach

This approach is based essentially on the most prominent style in the direct environment of the construction site. In that case, most of envioning buildings are storage houses (fig. 6) called dozo-dukuri.

E. Atmosphere Approach

The atmosphere approach is based on the different architectonic languages used in the preservation area. Though, this approach is more based on the general atmosphere, the design team got inspiration from formal criteria such as shapes, colors, and materials.

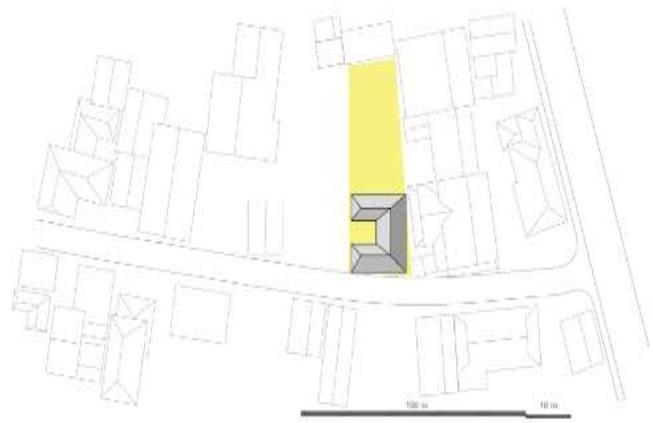


Fig. 4. Position of the initial kudo-dukuri.

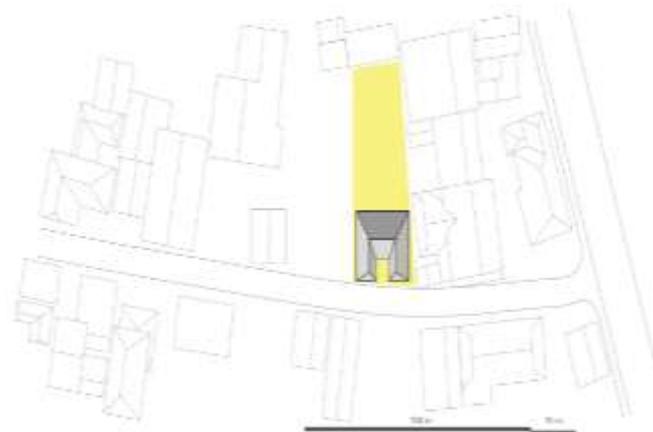


Fig. 5. Position of kudo-dukuri in the design suggestion.

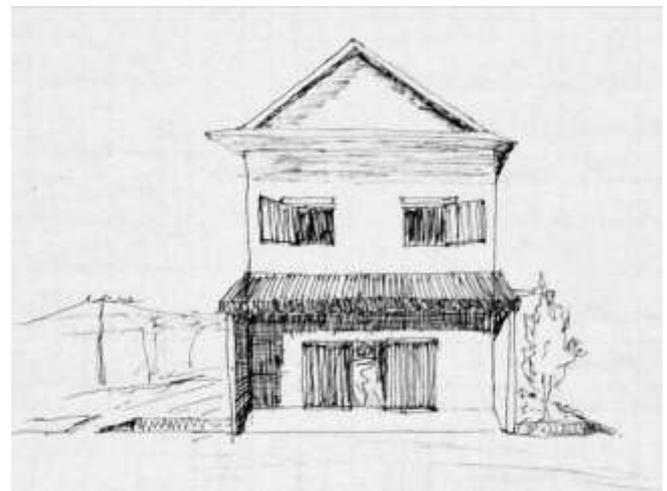


Fig. 6. dozo-dukuri design suggestion.

F. Questionnaire Design

As mentioned below (ch. III. Literature review) two kinds of variable were selected as relevant for urban insertion survey: those that relate to the structure of forms for their own sake designated below as Formal variable and those that related to content of forms designated below as Symbolic variable. [27]

Attributes of formal variable includes shape, proportion, rythm, scale, complexity, color, illumination, shadowing, order, hiaerarchy, spatial relations, incongruity, ambiguity, surprise, and novelty. [10]-[12]

The conducted survey questions the perception of most prominent variables with their physical surroundings. [18], [19] They include: Enclosure, complexity (richness), surprise (identifiability), proportion, compatibility with neighboring, color.

Symbolic variable reflects the individual's internal representation of the building and meaning associated with that representation of the building. We surveyed denotative meaning such as the style, and connotative meanings such as calmness and excitement, Naturalness, style, upkeep (suitable with environment or not), pleasantness, excitement, calmness.

Formal and symbolic variable interact, for example, a set of formal variables can take on stylistic contents, and style perception can affect the judgement of formal properties.

V. DESIGN OPTIONS

For the new building insertion, students designed three alternatives consecutively based on the history of the site, its direct environment and the general atmosphere of the district.

A. History Approach

There used to be a thatched house in the site, as it exists in other places in Hizenhamashuku, history approach aims to give more authenticity to the project and to revive the history of the site. In addition, a thatched house will give an original image to the project surrounded by story houses and create a link with Hamashozumachi-makanayamachi district where we can find more of this kind of structure (Fig. 7-8).



Fig. 7. Site insertion.



Fig. 8. Kudo-dukuri plan.

B. Environment Approach

The environment of the site is essentially composed of store houses or "Dozo-dukuri". These store houses use different language elements related to different eras.

Designing the project using environment language will keep the harmony of Sakagura Street and empower the traditional atmosphere of the street. (fig. 9-10)



Fig. 9. Dozo-dukuri plan.



Fig. 10. Dozo-dukuri insertion.

C. Atmosphere Approach

The third approach was meant to draw from the other styles existing in hizen-hamashuku traditional style of architecture. This approach was willing to bring more diversity to the site without harming its traditional image and the general atmosphere of the site. Inspiring from the envionring atmosphere doesn't mean necessary to use a traditional architectural language but can combine as thereafter, (Fig. 9-10) modern and traditional styles.

The student's groups followed the previous instruction though, we will focus in this research on the surveyed students' perception on the building insertion. In that order, the questionnaire contained mainly graphic elements describing the exterior appearance of the three designs.

VI. ANALYSES OF PERCEPTION

A. Historical Approach

For the first design the enclosure was considered by the panel moderate to dense, the façade is visually moderately rich, it is easily identifiable, Proportional and compatible with neighboring building. The color is suitable, the style is

natural and well identifiable, it is suitable with environment and generally the design is pleasant and calm.



Fig. 11. Dozo-dukuri insertion.



Fig. 12. Dozo-dukuri insertion.

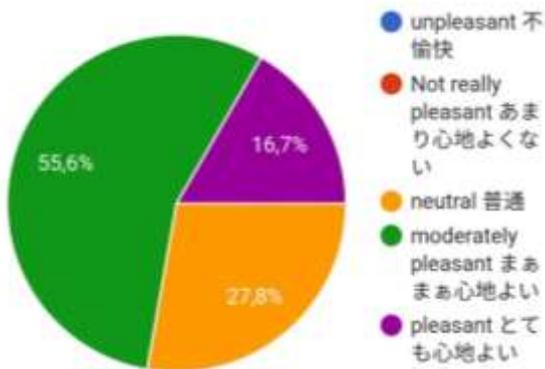


Fig. 13. Pleasantness statistics for historic approach.

Historic design was designated as the most pleasant one. It is associated with high calmness and neutral excitement, it was judged as well natural and suitable with the environment but in the other hand the façade was perceived as moderately rich. (Fig. 13)

B. Environmental Approach

The environment approach project has a moderate enclosure; the façade is visually neutral to moderately rich. The design was considered as moderately easily identifiable but not really proportional and presenting neutral compatibility with neighboring building. Color is neutral but the aspect is merely artificial. The style is moderately difficult to identify. The panel was neutral considering the suitability with the environment.

The symbolic variables; pleasantness, calmness and excitement, received a generally neutral answer.

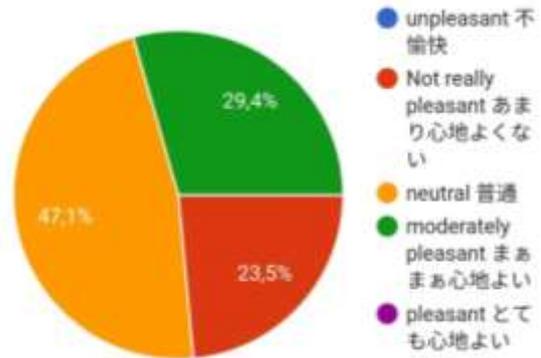


Fig. 14. Pleasantness statistics for environmental approach.

Most of reaction about environment design was neutral. It is the less pleasant proposal of the set. It is associated with neutral calmness and neutral excitement. The design was perceived as artificial, merely compatible with its environment and moderately identifiable. (Fig. 14)

C. Atmosphere Approach

The environment approach project has a moderate enclosure, the façade is moderately poor. We can identify merely easily the building exterior and it is moderately proportional. But the building was considered as hardy compatible with neighboring building and having some artificial aspect as the color is considered as moderately suitable. The style of the building is moderately difficult to identify and it is merely unsuitable with environment. Finally the design is moderately pleasant with a neutral perception of excitement and calmness.

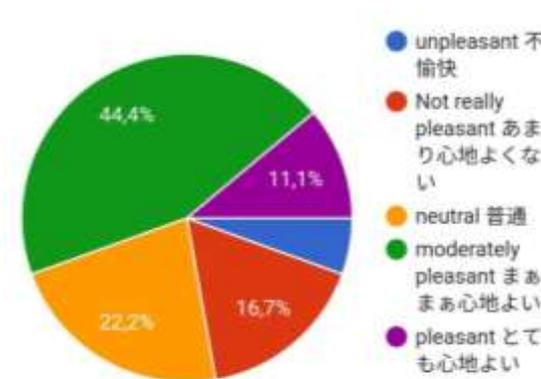


Fig. 15. Pleasantness statistics for Atmosphere approach.

This design was perceived as moderately pleasant, with a high positive perception of proportions and color, but a

relatively low perception of naturalness and suitability with the environment. It is also associated with a neutral calmness and excitement feeling. (Fig. 15)

VII. EVALUATION

As the research is based on Likert’s-like questionnaire, a 5-point score was set up to summarize the questionnaire result with a 5 points score for the highest answer and 1 point score for the lowest. An average score for each variable was calculated using this formula: (for. 1)

$$\bar{x} = \frac{\sum_k \binom{n}{k} x}{n}$$

For. 1. Average score calculation formula.

TABLE I. CRITERIA SUMMARIZATION

	History	Environment	Atmosphere
Density	3,3	2,7	3,1
Richness	2,8	2,5	2,1
Identifiability	3,6	3,6	3,2
Proportions	3,5	2,9	3,5
Compatibility	3,5	3,1	2,4
Color	4	3,2	3,6
Naturalness	4	2,3	1,9
Style Identifiability	3,2	2,3	2,3
Suitability with environment	4,1	2,2	2
Pleasantness	3,9	2,4	3
Excitement	3,2	3	3,4
Calmness	4,3	2,2	2,8

This table (Table I) and chart (Fig. 16) shows that some criteria are more correlated to the pleasantness criterion such as calmness, suitability with the environment, neighboring and the color.

In the case of identifiability, the identifiability of the building seems not correlated to the pleasantness; meanwhile the identifiability of the style seems strongly related to this main criterion. Thus, it is more important to identify the style of the building than the building itself. It also shows that the panel attaches a great significance to a moderate originality of the exteriors and a greater significance to the suitability with the environment.

Some other criteria are less relevant such as proportions.

The analyzes of the results shows then that a pleasant design is perceived as calm, natural and easily identifiable but presents at the same time a moderately rich façade which can be interpreted as encouraging for the use of the rich local architectural language without overcharging the façade design.

VIII. LIMITATION

With an average range of 2 to 4 scores in the answers, it is not unlikely that peoples’ answers will be influenced by previous questions, or will heavily concentrate on one response side (agree/disagree). Frequently, people avoid

choosing the “extremes” options on the scale, because of the negative implications involved with “extremists”, even if an extreme choice would be the most accurate.

This research should be mixed with statistical analysis and/or other research using different methodology for more accurate results.

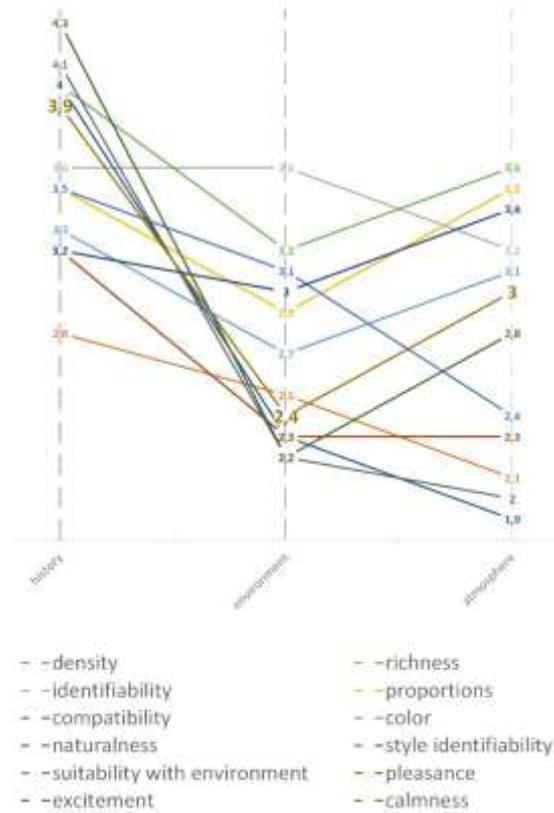


Fig. 16. Evolution of variables correlation.

IX. CONCLUSION

According to Jack L. Nasar [27] establishing a set of relevant variables aims to suggest directions for design and a set of physical and human characteristics worth further attention but these recommendations should not be seen as final but rather as hypotheses to carry out and test.

Previous researches on that topic revealed that for pleasantness, design review might encourage ordering, familiar and historical elements. It should present a moderate complexity and reduce artificial nuisances. Finally the design should be more “popular” and more accessible to the common users.

In our case, regarding an urban heritage area context, pleasantness criterion is highly related to the suitability with its environment, which leads finally to the encouragement of historical elements use. Calmness is also one of the major relevant variables, and indeed, it encourage the use of ordering and familiar elements, and a moderate complexity.

These variables’ values are similar in both, previous and current research, but as a project inserted in an urban heritage area, other variables presents different values including style identifiability and naturalness variables.

This research suggests directions for design and highlights a set of variable worth further attention in case of insertion of a new building in an urban heritage area.

Aesthetic assessment is a process that can go beyond the general guidelines to generate practical guidance for specific projects. With the development of criteria based on this research, design review can be refined to meet goals for community management.

Although, further research should be conducted on this topic, while varying research sites and research methodologies on the purpose of obtaining a more accurate and valuable design guidelines.

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