Application of Text-Based Design Guidelines to Building Permit Review Communication -
Part I: The Influence of Field of Experience

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Abstract
This series of studies investigated how "Field of Experience," "Semantic interpretation," and "Group Communication Pressure" influence the application of text-based design guidelines to graphic-based building designs, and cause communication failures during building permit review communication. In this first part, authors invited 16 experts in building design and divided them into four groups with similar fields of experience to assess design indicators by using the Fuzzy Delphi Method. The results showed that among various professionals, their varying fields of experienced caused design indicators to be assessed discrepantly. Authors plan to continue to explore how text-based design guidelines negatively influence communication effectiveness through semantic differences and group communication pressure and how to enhance communication effectiveness in the building design review processes.

Keywords: building design; communication; field of experience; design process; Fuzzy Delphi method

1. Introduction
Building permit review is a multi-indicators decision-making process that involves numerous participants and rules. Whether text-based design guidelines are useful for decision-making related to reviewing building permits is a crucial problem. The review decision-making system in Taiwan may be applied to projects as varied as an administrative review performed by a single official reviewer or a review committee consisting of a group of experts. Because communication is required during these building permit review processes, effective text-based design guidelines must be established to serve as a communication tool in Taiwan.

1.1 Theory of Communication
Communication theory, which is mathematically based, was proposed by Shannon and Weaver in 1949 on the basis of a transmission conversion concept. As indicated by Shannon and Weaver, a sender uses a communication channel to convert data and transmit the data to a receiver; the communication channel contains noise, which can be overcome using redundancy (Shannon and Weaver, 1949). Communication theory formed a foundation for subsequent studies on communication. However, some studies on the theory have reported that differences in communication processes, communication tools, and information translation influence the communication effectiveness of a decision-making model and result in communication failure. The causes of communication failure can be explored from three aspects. First, the 'semantics' and 'internal feedback' proposed by Osgood and Sebeok in 1954 can influence communication. Osgood and Sebeok indicated that the communication theory proposed by Shannon and Weaver was mechanical and unidirectional; according to communication theory, self-transmission, self-reception, and the meanings of signs must be considered, and the internal feedback caused by personal language being encoded and decoded can influence interpersonal communication (Osgood and Sebeok, 1954). Second, in accordance with Osgood and Sebeok's model, Schramm proposed that interpersonal communication must consider the 'field of experience' of senders and receivers. Schramm indicated that communication participants must share common experiences to effectively communicate with one another. Common experiences can result in effective communication; without them, communication participants cannot effectively communicate with one another. Regarding the concept of feedback, Schramm indicated that in addition to internal feedback caused by personal encoding and decoding, the concept of

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feedback was related to the cycle of external feedback provided by communication participants (Schramm, 1954). Third, Asch proposed ‘Asch conformity experiments’ and showed that when group opinions differ from personal opinions, most people conform to the group opinions (Asch, 1955). Therefore, all these reasons for communication failure are related to how people understand and use communication media.

Design guidelines are a crucial communication tool for the architectural design processes that are expected to help participants reach a consensus (Roderick, 1993). However, both central and local governments in Taiwan currently have various requirements for, and various professionals have differing opinions about building design guidelines. As a result, professional techniques cannot be uniformly developed under uniform building administration and supervision conditions. Accordingly, some architects have criticized official reviewers for applying excessive discretionary power that limits the artistic development of building design. In contrast, some official reviewers have criticized architects for their excessive design freedom when designs disregard the requirements of public safety. Typically, architects or official reviewers interpret guidelines discrepantly (Chiang, 2014). The present study hypothesized that when text-based design guidelines are applied to graphic-based building design thinking (Purcell and Gero, 1998), communication failure might occur because of participants’ different fields of experience and semantic translations as well as group communication pressure.

In accordance with Schramm’s communication model, the present study explored whether differing ‘field of experience’ resulted in differences in the evaluation of professional indices and influenced final decisions. Authors conducted a literature review, summarized the minutes of meetings, and identified 12 main indicators. By Fuzzy Delphi Method (FDM) to assess indicators, authors investigated four groups of review committee experts (i.e., 16 committee experts) with various types of architectural knowledge and experience and examined differences in the evaluation of 12 main indicators for the design of congregate housing among the 16-committee experts under the same text-based design guidelines. Authors also explored how their differences of fields of experience influenced the decision-making of the 16-committee experts. By using the results, authors analyzed how differences in the professional ‘field of experience’ influenced professional decision-making. Moreover, authors designed subsequent studies on the basis of the results.

1.2 The Mechanism of Building Permit Review in Taiwan

Concerning the building permit review processes in Taiwan, to maintain public safety, public transportation methods, public health, and building aesthetics, both central and local governments are required to set the permit processing and enact the design guidelines for design reviews. The building permit review process consists of two mechanisms: administrative review and review committee. For the administrative review, official reviewers are required to independently review a proposed design and determine whether the design conforms to building design regulations, zoning, and construction laws. For the review committee, experts are required to review some special issues, such as urban design, open-space design, and hillside building permit. In addition, regarding design guidelines, text-based guidelines cover 17 categories (including fire prevention and evacuation, high-rise building design, open space, and accessibility) and 323 rules related to design quality management. Architects must follow the design guidelines and official reviewers must perform a discretionary examination according to the design guidelines. However, this mechanism is a decision-making system related to building permit review in Taiwan.

1.3 Text-based Guideline as Communication Tool

In Taiwan, the Building Technical Regulations (BTR) are the most crucial building design management rules. Architects must design a building in accordance with the BTR and official reviewers must review the building design in accordance with the BTR. Therefore, BTR is the most crucial communication tool for participants during the building permit review processes. Since the BTR were announced in 1945, they have been revised almost 100 times; however, most articles are text-based guidelines and only a few are legends. During the permit review processes, if a disagreement about the meaning of a regulation occurs, the central government must issue a legal interpretation of the regulation. If a disagreement about a design effectiveness assessment occurs, the local government must determine the discretionary standards in accordance with the requirements of building administration.

The complete BTR comprise four chapters: General regulations, Building design and construction, Building structure, and Facilities. The building design and construction is the most important chapter for architects and official reviewers during review processes. Numerous disputes about law enforcement have occurred concerning regulations in this chapter. The present study focused on the section “Implementation of the Comprehensive Plan for Building Sites Included in Urban Planning”. In this section, a volume conversion system is specified to encourage the provision of open-spaces for public use; according to this section, the local government must establish a review committee to review design effectiveness. This section contains 13 text-based articles and no legends. The central government legislates and local governments enforce the law; therefore, 22 local governments in Taiwan have developed their own management models to respond to local requirements and the central government has issued 32 additional legal interpretations related to 13
2. Methodology
In the present study, the FDM was used to examine whether differences in the field of experience among building design-related professionals caused the professionals to interpret text-based design guidelines discrepantly. The following steps were applied: (1) define the research scope; (2) group experts; (3) establish assessment indicators for building designs; and (4) analyze the two-stage evaluation of indicators. The details are provided as follows.

2.1 Define the Research Scope
In the present study, the chapter "Implementation of the Comprehensive Plan for Building Sites Included in Urban Planning" of BTR was selected as the research target. The reasons are as follows:
1) A total of 13 text-based articles in the chapter are used as communication tools for the design guidelines of open-space. However, local governments currently use a discretionary method to interpret the law enforcement practices for this chapter. Accordingly, despite identical regulations, various management outcomes occur (articles from 281 to 292).
2) According to article 290 of the chapter, the local government is authorized to form a review committee. The review committee is required to assess whether a design proposal meets the requirements for open-space and to determine whether the additional building bulk reward should be provided.
3) The review committee should comprise architects, reviewers, scholars, and developers.

2.2 Group Experts
When local governments form a review committee, committee members are typically categorized into four groups according to the related regulations: reviewers, scholars, architects, and developers. From each group, four experts were invited to participate in reviewing building design; subsequently, the FDM was conducted among these experts.

2.3 Establish Indicators for Building Designs
In this study, to establish indicators for building designs, authors reviewed relevant literature of building design quality indicators (Barnett and Jones, 1982; Egon, 1987; Gann et al., 2003; Gardiner and Rothwell, 1985; Roderick, 1993; Shirvani, 1985) and summarized the minutes of review committees held in Taoyuan and New Taipei City in Taiwan. The proposed important indicators are as follows: sustainable development, facilities maintenance, market strategy, building security, public interest, financial affairs, spatial function, urban form, environmental impact, building aesthetic, intelligent technology, and multiple satisfactions. As shown in Table 1.

| No. | Indicators                  | The operating type definition                                                                 |
|-----|-----------------------------|------------------------------------------------------------------------------------------------|
| 1   | Sustainable development     | The effectiveness of energy use of the proposed design must be assessed. The main factors are the use of green building materials, low energy consumption, and the use of renewable energy. Whether the proposed design can be easily maintained at the usage stage must be assessed. The main factors are economic maintenance, durability of the facilities, and ease of maintenance. |
| 2   | Facilities maintenance      | Whether the proposed design meets the requirements of the capital market must be assessed. The main factors are product positioning, supply and demand, and design-related competitiveness. The building security of the proposed design must be assessed. The main factors are fire protection equipment, disaster prevention, shelters, and security operations. Whether a proposed design meets the social requirements and public interests must be assessed. The main factors are public facilities, public policies, and local development. The financial feasibility of the proposed design must be assessed. The main factors are construction costs, building volume effectiveness, the increase of building volume, and feedback costs. |
| 3   | Market strategy             | The spatial function of the proposed design must be assessed. The main factors are spatial size,ergonomics, dynamic flow, and the design of accessibility. The urban form of the proposed design must be assessed. The main factors are urban textures, walking areas and open space, skyline, and visual conflicts. The environmental impact of the proposed design must be assessed. The main factors are land conservation, sunshine rights, traffic impact, and operation pollutions. The design appearance of the proposed design must be assessed. The main factors are shape and color. Whether the proposed design provides intelligent services must be assessed. The main factors are intelligent safety management, intelligent energy-saving control, and intelligent services. Whether the proposed design satisfies the affected people must be assessed. The main factors are user satisfaction, conveyance of design concepts, and brand image. |
| 4   | Building security           | The effectiveness of energy use of the proposed design must be assessed. The main factors are the use of green building materials, low energy consumption, and the use of renewable energy. Whether the proposed design can be easily maintained at the usage stage must be assessed. The main factors are economic maintenance, durability of the facilities, and ease of maintenance. |
| 5   | Public interest             | Whether a proposed design meets the requirements of the capital market must be assessed. The main factors are product positioning, supply and demand, and design-related competitiveness. The building security of the proposed design must be assessed. The main factors are fire protection equipment, disaster prevention, shelters, and security operations. Whether the proposed design meets the social requirements and public interests must be assessed. The main factors are public facilities, public policies, and local development. The financial feasibility of the proposed design must be assessed. The main factors are construction costs, building volume effectiveness, the increase of building volume, and feedback costs. |
| 6   | Financial affairs           | The spatial function of the proposed design must be assessed. The main factors are spatial size,ergonomics, dynamic flow, and the design of accessibility. The urban form of the proposed design must be assessed. The main factors are urban textures, walking areas and open space, skyline, and visual conflicts. The environmental impact of the proposed design must be assessed. The main factors are land conservation, sunshine rights, traffic impact, and operation pollutions. The design appearance of the proposed design must be assessed. The main factors are shape and color. Whether the proposed design provides intelligent services must be assessed. The main factors are intelligent safety management, intelligent energy-saving control, and intelligent services. Whether the proposed design satisfies the affected people must be assessed. The main factors are user satisfaction, conveyance of design concepts, and brand image. |
| 7   | Spatial function            | The effectiveness of energy use of the proposed design must be assessed. The main factors are the use of green building materials, low energy consumption, and the use of renewable energy. Whether the proposed design can be easily maintained at the usage stage must be assessed. The main factors are economic maintenance, durability of the facilities, and ease of maintenance. |
| 8   | Urban form                  | The effectiveness of energy use of the proposed design must be assessed. The main factors are the use of green building materials, low energy consumption, and the use of renewable energy. Whether the proposed design can be easily maintained at the usage stage must be assessed. The main factors are economic maintenance, durability of the facilities, and ease of maintenance. |
| 9   | Environmental impact        | The effectiveness of energy use of the proposed design must be assessed. The main factors are the use of green building materials, low energy consumption, and the use of renewable energy. Whether the proposed design can be easily maintained at the usage stage must be assessed. The main factors are economic maintenance, durability of the facilities, and ease of maintenance. |
| 10  | Building aesthetic          | The effectiveness of energy use of the proposed design must be assessed. The main factors are the use of green building materials, low energy consumption, and the use of renewable energy. Whether the proposed design can be easily maintained at the usage stage must be assessed. The main factors are economic maintenance, durability of the facilities, and ease of maintenance. |
| 11  | Intelligent technology      | The effectiveness of energy use of the proposed design must be assessed. The main factors are the use of green building materials, low energy consumption, and the use of renewable energy. Whether the proposed design can be easily maintained at the usage stage must be assessed. The main factors are economic maintenance, durability of the facilities, and ease of maintenance. |
| 12  | Multiple satisfactions      | The effectiveness of energy use of the proposed design must be assessed. The main factors are the use of green building materials, low energy consumption, and the use of renewable energy. Whether the proposed design can be easily maintained at the usage stage must be assessed. The main factors are economic maintenance, durability of the facilities, and ease of maintenance. |
2.4 Analyze the Two-stage Evaluation of Indicators

For the final step, experts were invited to complete an expert questionnaire regarding the evaluation of indicators. In the present study, the FDM was used to conduct a multistage questionnaire survey until a consensus is reached. At the first stage of FDM, experts presented inconsistent opinions; at the second stage, a consensus was reached between 16 experts from the four groups regarding the importance of indicators. Authors analyzed the assessment results and conducted interviews to understand the differences among the various groups of experts.

3. The Influence of 'Field of Experience'

3.1 Composite Indicators Assessment Analysis

In the present study, authors invited 16 experts to complete the two-stage FDM before a consensus is reached regarding the importance of the indicators. To obtain accurate results, authors classified the 12 indicators into four levels (extremely pertinent, pertinent, irrelevant, and extremely irrelevant). Each level comprised three indicators. The results are provided as follows.

The results of the first-stage survey showed that a consensus was reached regarding only three indicators: building aesthetic (irrelevant), public interest (extremely irrelevant), and intelligent technology (extremely irrelevant). No consensus was reached regarding the other indicators. The tendencies of the indicators were categorized into single-group deviation, polarized deviation, and complete discrepancy. Regarding single-group deviation, three groups considered facilities maintenance, building security, and spatial function extremely pertinent; specifically, the architects considered facilities maintenance extremely irrelevant, the official reviewers considered building security irrelevant, and the scholars considered spatial function irrelevant. Regarding polarized deviation, the official reviewers and architects considered urban form extremely pertinent whereas the scholars and the developers considered urban form irrelevant. In addition, the architects and developers considered financial affairs and market strategy pertinent whereas the official reviewers and the scholars considered financial affairs and market strategy extremely irrelevant. Different professionals had a complete discrepancy about environmental impact and sustainable development. According to the results of the first-stage FDM, a significant discrepancy existed among the groups.

For the results of the second-stage FDM, the 16 experts reached consensus regarding the importance of the indicators (Table 2). The extremely pertinent indicators were spatial function, building aesthetic, and building security; the pertinent indicators were urban form, facilities maintenance, and environmental impact; the irrelevant indicators were sustainable development, public interest, and multiple satisfaction; and the extremely irrelevant indicators were financial affairs, market strategy, and intelligent technology.

With the FDM, a consensus was reached. However, the experts held different views about the importance of the indicators. The experts held consistent views about only three indicators: (1) intelligent technology was considered extremely irrelevant; (2) spatial function was considered extremely pertinent or pertinent; and (3) building aesthetic was considered extremely pertinent or pertinent. Except for these three indicators, the experts held different views about all other indicators. A further analysis was performed to understand group differences.

### Table 2. Assessment of Design Indicators Results by All Experts

| Sustainable development | Market strategy | Facilities maintenance | Public interest | Spatial function | Urban form | Environmental impact | Building aesthetic | Intelligent technology | Multiple satisfaction |
|-------------------------|-----------------|------------------------|-----------------|-----------------|-----------|----------------------|-------------------|----------------------|----------------------|
| Min                     | 7               | 6                      | 8               | 8               | 7         | 9                    | 6                 | 5                    | 7                     | 4                     |
| Max                     | 9               | 8                      | 8               | 6               | 8         | 10                   | 8                 | 6                    | 7                     | 4                     |
| Mean                    | 9               | 8                      | 8               | 7               | 7         | 8                    | 8                 | 7                    | 6                     | 4                     |

For the results of the second-stage FDM, the 16 experts reached consensus regarding the importance of the indicators (Table 2). The extremely pertinent indicators were spatial function, building aesthetic, and building security; the pertinent indicators were urban form, facilities maintenance, and environmental impact; the irrelevant indicators were sustainable development, public interest, and multiple satisfaction; and the extremely irrelevant indicators were financial affairs, market strategy, and intelligent technology.

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3.2 Importance of the Indicators According to Different Professionals

3.2.1 Official Design Reviewers

According to the results from the official design reviewers, the extremely pertinent indicators were environmental impact, public interest, and building aesthetic; the pertinent indicators were urban form, facilities maintenance, and spatial function; the irrelevant indicators were sustainable development, building security, and market strategy; and the extremely irrelevant indicators were intelligent technology, multiple satisfaction, and financial affairs. Regarding the following indicators, significant differences existed between the assessment results produced by the group of reviewers and those by the four professional groups, as shown below (Table 3).

1) The reviewers considered environmental impact to be an extremely pertinent indicator and ranked it first among the 12 indicators. Overall, on average, the experts considered environmental impact as a pertinent indicator and ranked it sixth. The scholars also considered environmental impact to be an important indicator and ranked it sixth.

2) The reviewers considered public interest to be an extremely pertinent indicator and ranked it second among the 12 indicators; however, overall, the experts considered public interest to be an irrelevant indicator and ranked it eighth. Excluding the group of reviewers, the other groups considered public interest to be an extremely irrelevant indicator and ranked it eleventh.

2) The reviewers considered spatial function to be an extremely pertinent indicator and ranked it second among the 12 indicators; however, overall, the experts considered spatial function to be a pertinent indicator and ranked it fifth among the 12 indicators. Overall, on average, spatial function was considered extremely pertinent and ranked first by the four groups.

4) The reviewers considered building security to be an irrelevant indicator and ranked it eighth among the 12 indicators; however, overall, building security was considered extremely pertinent and ranked third by the four groups.

3.2.2 Scholars

According to the results from the scholars, the extremely pertinent indicators were building security, building aesthetic, and urban form; the pertinent indicators were sustainable development, spatial function, and environmental impact; the irrelevant indicators were facilities maintenance, financial affairs, and multiple satisfaction; and the extremely irrelevant indicators were market strategy, public interest, and intelligent technology. Concerning the following indicators, slight differences existed between the assessment results produced by the group of scholars and those by the four groups (Table 4).

1) The scholars considered sustainable development to be a pertinent indicator and ranked it fourth among the 12 indicators; overall, sustainable development was considered irrelevant and ranked seventh by the four groups.

2) The scholars considered spatial function to be a pertinent indicator and ranked it fifth among the 12 indicators; overall, spatial function was considered extremely pertinent and ranked first by the four groups.

Table 3. Indicators Assessment by the Reviewers

| Sustainable development | Facilities maintenance | Market strategy | Building security | Public interest | Financial affairs | Spatial function | Urban form | Environmental impact | Building aesthetic | Intelligent technology | Multiple satisfaction |
|-------------------------|------------------------|-----------------|------------------|----------------|-----------------|-----------------|-----------|----------------------|---------------------|----------------------|----------------------|
| A                       | 9                      | 8               | 8                | 9               | 8               | 9               | 10        | 8                    | 9                   | 8                    | 7                    |
| B                       | 7                      | 6               | 8                | 7               | 6               | 5               | 9               | 10                   | 8                   | 10                   | 9                    |
| C                       | 7                      | 6               | 8                | 7               | 6               | 5               | 9               | 10                   | 8                   | 10                   | 9                    |
| G1                      | 7                      | 6               | 8                | 7               | 6               | 5               | 9               | 10                   | 8                   | 10                   | 9                    |
| min                     | 7                      | 6               | 8                | 7               | 6               | 5               | 9               | 10                   | 8                   | 10                   | 9                    |
| max                     | 9                      | 8               | 8                | 8               | 9               | 9               | 10               | 9                    | 9                   | 10                   | 9                    |
| M                       | 7.71                    | 7.60            | 8.49             | 8.00            | 7.00            | 6.74            | 5.73            | 7.74                  | 7.42                | 6.40                 | 8.43                |

G1G

G1-Rank
7 5 9 8 2 12 6 4 1 3 10 11

W-Rank
7 5 11 3 8 10 1 4 6 2 12 9

Table 4. Indicators Assessment by the Scholars

| Sustainable development | Facilities maintenance | Market strategy | Building security | Public interest | Financial affairs | Spatial function | Urban form | Environmental impact | Building aesthetic | Intelligent technology | Multiple satisfaction |
|-------------------------|------------------------|-----------------|------------------|----------------|-----------------|-----------------|-----------|----------------------|---------------------|----------------------|----------------------|
| E                       | 7                      | 6               | 8                | 8               | 9               | 7               | 9         | 7                    | 6                   | 9                    | 8                    |
| F                       | 7                      | 6               | 8                | 6               | 9               | 7               | 9         | 7                    | 7                   | 8                    | 6                    |
| G                       | 8                      | 7               | 8                | 6               | 8               | 5               | 6         | 7                    | 6                   | 9                    | 6                    |
| G2 H                    | 8                      | 7               | 8                | 9               | 5               | 6               | 7         | 6                    | 9                   | 7                    | 6                    |
| min                     | 7                      | 6               | 8                | 5               | 7               | 5               | 6         | 7                    | 8                   | 6                    | 5                    |
| max                     | 8                      | 7               | 9                | 7               | 6               | 6               | 7         | 8                    | 9                   | 7                    | 6                    |
| M                       | 7.24                    | 6.00            | 8.24             | 6.88            | 5.05            | 8.21            | 5.06        | 8.40                  | 7.42                | 6.40                 | 8.74                |

G2G

G2-Rank
4 7 10 1 11 8 5 3 6 2 12 9

W-Rank
7 5 11 3 8 10 1 4 6 2 12 9
3.2.3 Architects
As shown in Table 5, according to the architects, the extremely pertinent indicators were spatial function, building security, and urban form; the pertinent indicators were multiple satisfaction, facilities maintenance, and building aesthetic; the irrelevant indicators were environmental impact, market strategy, and sustainable development; and the extremely irrelevant indicators were financial affairs, public interest, and intelligent technology. Regarding the following indicators, differences existed between the assessment results produced by the group of architects and those by the four groups (Table 5).

1) The architects considered multiple satisfaction to be a pertinent indicator and ranked it fourth among the 12 indicators; overall, multiple satisfaction was considered irrelevant by the other three groups and ranked ninth on average by the four groups.

2) The architects considered building aesthetic to be a pertinent indicator and ranked it sixth among the 12 indicators; overall, building aesthetic was considered extremely pertinent and ranked second by the four groups.

3.2.4 Developers
According to the developers, the extremely pertinent indicators were market strategy, facilities maintenance, and spatial function; the pertinent indicators were building aesthetic, financial affairs, and building security; the irrelevant indicators were environmental impact, multiple satisfaction, and urban form; and the extremely irrelevant indicators were sustainable development, public interest, and intelligent technology. Regarding the following indicators, significant differences existed between the assessment results produced by the group of developers and those by the four groups (Table 6).

1) The developers considered market strategy to be an extremely pertinent indicator and ranked it first among the 12 indicators; overall, market strategy was considered extremely irrelevant and ranked eleventh among the 12 indicators by the four groups; the other three groups considered this indicator irrelevant or extremely irrelevant.

2) The developers considered financial affairs to be a pertinent indicator and ranked it fifth among the 12 indicators; overall, financial affairs were considered as extremely irrelevant and ranked tenth by the four groups; the other three groups considered both market strategy and financial affairs irrelevant or extremely irrelevant.

3) The developers considered urban form to be an irrelevant indicator and ranked it ninth among the 12 indicators; overall, urban form was considered pertinent and ranked fourth by the four groups.

3.3 Various Decision-making Tendencies Among Various Groups
Following the two-stage FDM, statistical results about the 12 design indicators were obtained. In addition, pertinent indicators for decision-making resembled those used in review cases. However, under the same decision-making tendency, different professional groups held different views about the importance of the design indicators. Therefore, the common decisions were compromised decisions. In the present study, authors conducted in-depth interviews to investigate whether the different views of the different groups about indicators became review and communication barriers and to examine influential aspects of the design indicators.

Table 5. Indicators Assessment by the Architects

| Sustainable development | Facilities maintenance | Market strategy | Building security | Public interest | Financial affairs | Spatial function | Urban form | Environmental impact | Building aesthetic | Intelligent technology | Multiple satisfaction |
|-------------------------|------------------------|-----------------|-------------------|-----------------|------------------|-----------------|------------|----------------------|-------------------|----------------------|-----------------------|
| Min                      | Max                    | Min             | Max               | Min             | Max              | Min             | Max        | Min                  | Max               | Min                  | Max                   |
| 4                       | 4                      | 6               | 6                 | 5               | 5                | 5               | 5          | 5                    | 5                 | 6                    | 6                     |

Table 6. Indicators Assessment by the Developers

| Sustainable development | Facilities maintenance | Market strategy | Building security | Public interest | Financial affairs | Spatial function | Urban form | Environmental impact | Building aesthetic | Intelligent technology | Multiple satisfaction |
|-------------------------|------------------------|-----------------|-------------------|-----------------|------------------|-----------------|------------|----------------------|-------------------|----------------------|-----------------------|
| Min                      | Max                    | Min             | Max               | Min             | Max              | Min             | Max        | Min                  | Max               | Min                  | Max                   |
| 4                       | 4                      | 6               | 6                 | 5               | 5                | 5               | 5          | 5                    | 5                 | 6                    | 6                     |

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The scholars adhered to their professional knowledge, had rigorous logical training, and therefore followed the objective review direction. Because of their logical training, the scholars explained that other indicators embodied the concept of public opinion. In addition, they disregarded public interest, which was defined ambiguously. Consequently, the group of scholars carefully reviewed various opinions and reached a strong consensus on decision-making.

The official reviewers considered environmental impact and public interest to be the two most pertinent indicators because these professionals play a management role and should assist people in maximizing public interest. Although sustainable development, building security, and intelligent technology should be considered for building designs, the research scope of this study was related to design assessment regarding open space. Therefore, sustainable development, building security, and intelligent technology were less crucial than environmental impact, public interest, and building aesthetic were. In addition, although market strategy and financial affairs were related to the research topic, the official reviewers were required to be prudent and conservative regarding additional building bulk reward because the related indicators involve personal interests. Because of professional training, the official design reviewers clearly defined the focus of review cases and related indicators. In other words, regarding open-space, the reviewers believed that review cases should focus on the public dimension of a design project to create the maximum public value. This review attitude and direction apparently differed from other types of decision-making attitudes of other groups of experts.

2) The scholars considered building security, building aesthetic, and urban form as extremely pertinent indicators. The reason was that the focus of the review was designated by guidelines. Therefore, according to the scholars, related indicators must be assessed to reduce the occurrence of disputes. According to the regulations, public interest must be reviewed; however, the scholars considered that the definition of public interest was unclear and a dispute could easily occur. Accordingly, the scholars considered public interest as an extremely irrelevant indicator and considered sustainable development as pertinent because it was going to be the future trend. The scholars adhered to their professional knowledge, had rigorous logical training, and therefore followed the objective review direction. Because of their logical training, the scholars explained that other indicators embodied the concept of public opinion. In addition, they disregarded public interest, which was defined ambiguously. Consequently, the group of scholars carefully reviewed various opinions and reached a strong consensus on decision-making.

3) The group of architects considered spatial function as the most pertinent indicator because according to the research scope it focuses on open-space creation and a design must satisfy user requirements concerning space. The space must meet the requirements for building security and urban form. In addition, as a designer, an architect should protect the opinion of his or her design. Therefore, the architects considered multiple satisfaction to be a pertinent indicator.

The group of architects particularly emphasized the importance of design indicators that manifested design values. In the review committee, the architects successfully played a role in technique assessment and design practices.

4) As indicated by the developers, for the purpose of development, whether a proposed design met requirements for market strategy and facilities maintenance must be considered. According to the design guidelines, architects can design open-space to obtain additional building bulk reward; therefore, the developers believed that as long as a design met the design guidelines, additional building bulk reward should be provided. Accordingly, financial affairs should be considered to be a pertinent indicator. Because the definitions of environmental impact and public interest were unclear, these two indicators should not be considered.

Developers must consider how to establish market economy. Compared with the other expert groups, the developers held a different view about the importance of indicators. The group of developers fully understood the requirements for implementing a design in reality. Therefore, the developers were integral members of the review committee.

In summary, the different groups held different views about the importance of indicators because their fields of experience and professions varied. Some professional groups emphasized the importance of some indicators whereas other groups emphasized the importance of others. For example, the group of scholars primarily emphasized sustainable development, the group of reviewers primarily emphasized public interest, the group of architects primarily emphasized multiple satisfaction, and the group of developers primarily emphasized market strategy and financial affairs. However, after reaching a consensus, the professionals ranked these indicators between the seventh and eleventh place. The results showed that difference in professions influenced the difference in the assigned importance of indicators and decision-making. The establishment of communication rules can ensure the feasibility of a building permit review processes.
4. Conclusion

The present study was a part of a series of studies that were based on communication theory. The purpose of the series was to investigate whether text-based design guidelines can be an effective communication tool and also be effectively applied to decision-making for the building permit review process. The series of studies investigated the causes of communication failure (i.e., differences in the professional fields of experience, semantic understanding, and group communication pressure). In the present study, “the chapter 'Implementation of the Comprehensive Plan for Building Sites Included in Urban Planning' in the Taiwanese BTR was used as the research scope and the FDM was used to assess the indicators and investigate whether different ‘fields of experience' caused professionals to interpret text-based design guidelines discrepantly and resulted in communication failure. Authors conducted a two-stage FDM among four professional groups (i.e., 16 experts). The results showed that various professional groups assessed design indicators discrepantly because of their different fields of experience; in addition, the results of the two-stage FDM survey showed that regarding some highly ranked indicators, a compromise was reached during group decision-making despite the different understanding between groups. Authors plan to expand this study to explore semantic understanding and group communication pressure. At this stage, tentative conclusions are presented as follows:

1) Design data and communication tools must be based on common understanding. Working experience and professional background influence communication effectiveness. With clear common values and goals, various professional groups can adjust their own opinions to reach a consensus.

2) Text-based design guidelines for graphic-based building designs can be interpreted discrepantly by participants with different knowledge backgrounds and experiences when the participants encode and decode the design guidelines. Accordingly, communication barriers or failure may occur. Those who attempt to establish a common review system for building permit review should endeavor to establish common values and goals and to reduce the occurrence of communication barriers or failure caused by various views of various professional groups about review cases.

3) In this study, authors used the two-stage FDM to help various professionals reach a consensus. Authors observed that personal convictions based on experience can be compromised when people attempt to reach a consensus. However, administrative agencies should be cautious about ensuring the decision-making quality.

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