

An Assessment Model for Private Contractor Selection

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Abstract. This study derives a development plan considering the specificity of adjacent sites on expressways such as limited development in relevant acts along with development constraints on expressways in Korea, ultimately setting the basic direction for selection of the private contractor for the project. In particular, this study included the development plan with excellent publicness in addition to securing adequate profitability that meets the development purpose according to the public institution that is the main agent of development. Then we set the basic direction for private contractor selection within the scope of efficiently using resources and guaranteeing at least certain profitability to meet the purpose of the project to develop adjacent sites on expressways.

Keywords: Expressway, assessment system, contractor selection, unused sites, private-public partnership project.

1. Introduction

The expected development constraints on expressways are limited development in relevant acts on expressways, competitive business with existing facilities and rest facilities on expressways, and there is a need for a development plan considering the specificity of adjacent sites on expressways. Existing facilities on expressways in Korea take various forms such as service areas, premium outlets, etc., and a development plan with excellent publicness is necessary in addition to securing adequate profitability that meets the development purpose of the public institution that is the main agent of development. To come up with a plan to develop such land on expressways, a survey is needed on the basic status of the sites, and in this case, this includes not only land and existing facilities but also terms and conditions of the contract and laws. Moreover, it is necessary to set the direction for development of the site considering the constraints such as competitive business with existing facilities and laws based on the survey. In particular, as there is a need to set the direction by providing adequate alternatives and reflecting the results of strict environmental assessment and competitive business with existing facilities, a suitable assessment system must be established to select a private contractor that fits the direction. To establish an assessment system that includes the assessment criteria and methods for private contractor selection, it is necessary to consider the individual features and specificity of the site that is subject to assessment. This assessment system is established in consideration of the adequate development direction, characteristics of the orderer and purpose of the order. The assessment system for private contractor selection of existing open competition projects is also mostly established according to the purpose of the orderer and thus varies depending on the purpose. For contractor selection, it is necessary to compare the characteristics of the orderer and potential participants based on the main assessment items, provide the basis to quantify them through consistency with the assessment items for existing open competition projects, and establish a customized assessment system for each category according to the direction for development since the relevant project has high specificity (Kim et al., 2018).

Therefore, this study forms the assessment system that makes up for the deficiencies of private contractor selection for existing open competition projects, derives improvement plans accordingly, and establishes the assessment system that remedied the shortcomings of the existing private contractor selection assessment system. Accordingly, this complements the tendency to self-defensively interpret contractor selection assessment due to lack of distinctiveness and artificial division such as differential grading of certain assessment items. In particular, this study intends to guarantee certain profitability to meet the purpose of the project to develop adjacent sites on expressways while also establishing an assessment system to perform development with excellent publicness (Kim and Cho, 2020). Therefore, the aim is to set the direction and establish the assessment system for development with high publicness and economic benefits (development benefits that affect the

society) according to development rather than profitability, while guaranteeing at least certain profitability, in order to develop unused sites to make efficient use of resources.

2. Related Works

2.1. Review of The Korea Expressway Corporation Act

Table 1. shows a summary of the Korea Expressway Corporation Act and the Enforcement Decree of the Act in Korea to set the direction for development (<http://data.ex.co.kr/portal>, April 29, 2020).

Table 1: Korea Expressway Corporation Act and Enforcement Decree of the Act related to development

Classification	Korea Expressway Corporation Act	Enforcement Decree of the Act
Businesses	Article 12 ① Scope of business 5. Installation and management of service areas and gas stations 10. Road site and facility use projects to promote utility of toll roads	Article 11-2 (Road Site and Facility Use Projects) - Projects related to multi-dimensional road development such as business, sales facilities or parking lots - Projects to install and manage transfer centers, complex transfer centers, parking lots, freight terminals, truck service areas, freight distribution and storage facilities, and sales facilities
	11. Development projects to improve the utility of toll roads, such as the installation of freight distribution and storage facilities in the area adjoining the toll roads, and to increase convenience and benefits for users	Article 11-3 (Road Adjoining Area Development Projects) - Road adjoining area: An area directly connected to the toll road, and is an area where Korea Expressway Corporation obtained approval from the Minister of Land, Infrastructure and Transport - Scope of adjoining area development projects: 1. Projects to install and manage passenger/freight terminals, transfer centers, complex transfer centers, truck service areas, freight distribution and storage facilities, sales facilities, and other facilities necessary for promoting efficiency of automobile traffic 2. Projects to install and manage accommodations, youth training facilities, sports facilities, social welfare facilities, cultural facilities, and other facilities for improving the utility of roads and convenience of users

	<p>13. Investment and contributions in projects related to the business of Korea Expressway Corporation</p>	<p>Article 11-5 (Investment)</p> <ul style="list-style-type: none"> - <u>Projects that can be invested in or contributed to</u> <u>5. Road site and facility utilization project and road adjoining area development project implemented to promote utility of toll roads and improve convenience of users</u> - <u>To invest in or contribute to the project, it shall be reported to the Minister of Land, Infrastructure, and Transport after resolution by the Board of Directors</u>
	<p>② Must obtain approval from the Minister of Land, Infrastructure, and Transport to implement the development project for road adjoining areas</p>	<p>Article 11-3 (Road Adjoining Area Development Projects)</p> <ul style="list-style-type: none"> - Details of application for project plan approval: Purpose/area, scale/implementation period/project costs, financing plan/others
<p>Consignment of Businesses</p>	<p>Article 12-2 May entrust the business to the person that Korea Expressway Corporation has invested in or contributed to with the approval of the Minister of Land, Infrastructure, and Transport</p>	

Source: Ministry of Government Legislation, 『Korea Expressway Corporation Act』 and 『Enforcement Decree of the Korea Expressway Corporation Act』

Moreover, the key contents of the Korea Expressway Corporation Act to set the direction for development can be summarized into direct investment, mutual investment company, and private finance (see, Table 2).

Table 2: Key contents of the Korea Expressway Corporation Act to set the direction for development

Classification	Key contents of the Korea Expressway Corporation Act
<p>Direct investment</p>	<ul style="list-style-type: none"> - Road site: (Article 12 of the Act) Development projects to promote utility of roads (e.g. rest, transfer facilities) - Adjoining area: (Article 12 of the Act) Development projects to promote utility of roads and user benefits Provided, that approval must be obtained from the Minister of Land, Infrastructure, and Transport to develop adjoining areas

Mutual investment company	<ul style="list-style-type: none"> - Road/adjoining area: (Article 11-5 of the Enforcement Decree) Development projects to promote utility of roads and user benefits (Provided, that approval must be obtained from the Minister of Land, Infrastructure, and Transport to develop adjoining areas) - To invest in or contribute to the project, it shall be reported to the Minister of Land, Infrastructure, and Transport after resolution by the Board of Directors
Private finance	<ul style="list-style-type: none"> - Road/adjoining area: Permitted within permissible building according to land use

A legal definition of rest facilities on expressways shows that rest facilities are classified as road appurtenances according to Article 2 of the Road Act, and by building use, they are classified as ‘service areas’ among ‘tourist resting facilities’ based on attached Table 2 of Article 3-5 of the Enforcement Decree of the Building Act. Moreover, as the basis for installation, according to Article 40 paragraph (1), rest facilities and other similar facilities must be installed on the road for smooth traffic, safe passage, or public convenience. Types of service areas and formation of installation facilities show that, according to Road Design Guidelines (2012), service areas are classified into general service areas (buildings and structures such as speed transmission roads, parking lots, and charging stations), truck service areas (general service area facilities + facilities for truck drivers such as freight agencies, freight information center, laundry, bathing and sleeping facilities), simple service areas (basic facilities: speed transmission roads, parking lots, greens, restrooms), optional facilities such as small snack bars or gas stations, rest areas (restrooms, minimum space for drivers and cars to rest). Moreover, according to Road Design Know-How (2009), service areas are classified into comprehensive service areas (facilities for people, facilities for cars, facilities for those with physical disabilities) and simple service areas (minimum facilities needed for simple checkup and maintenance of cars in short time, and access transmission roads, convenience stores and restaurants such as parking lots, greens, restrooms, convenience stores, and gas stations are installed in normal size, and LPG stations are also installed if necessary)(<http://www.moleg.go.kr/>, April 29, 2020). The authority in charge of installation is Korea Expressway Corporation which is in charge of installing and managing service areas on toll roads and gas stations based on Article 12, paragraph (1)-5 of Korea Expressway Corporation Act.

2.2. Restriction on Behaviours for Each Special-purpose Area of Adjective Sites on Expressways

The special-purpose area of the adjacent sites on expressways of Korea is a planned control area among control areas, which is 100% planned control area that can be designated as a district-unit planning zone (Jeon, 2002), as shown in Table 3. Moreover, if at least 50% is a planned control area outside the city, it is possible to designate it as a district-unit planning zone (National Land Planning and Utilization

Act, Article 51, paragraph (3)).

Table 3: Classification of special-purpose areas (National Land Planning and Utilization)

Main category	Sub-category	Detail
Urban areas	Residential areas	Areas necessary to protect peaceful dwelling and sound living environment
	Commercial areas	Areas necessary to increase convenience in commerce and other businesses
	Industrial areas	Areas necessary to increase convenience of industries
	Green areas	Areas requiring the conservation of green areas to protect the natural environment, farmland and forests, health and sanitation, security and to prevent any disorderly sprawl of cities
Control areas	Conservation control areas	Areas difficult to be controlled by designating them as natural environment conservation areas, in consideration of relationship, etc. with peripheral special-purpose areas, while conservation is necessary to protect the natural environment, and forests, to prevent water pollution, to secure green spaces, to conserve ecosystems, etc.
	Production control areas	Areas difficult to be controlled by designating them as agricultural and forest areas, in consideration of relationship, etc. with peripheral special-purpose areas, while a control is needed for the production in agricultural, forestry and fishery businesses, etc.
	Planned control areas	Areas requiring planned and systematic control that are expected to be integrated into an urban area, but intended for restricted utilization and development in view of the natural environment
Agricultural and forest areas	-	Areas necessary to promote the agricultural and forest industry and to preserve forests, such as agricultural promotion areas under the Farmland Act, or conserved mountainous districts under the Mountainous Districts Management Act that do not belong to urban areas
Natural environment conservation areas	-	Areas necessary to preserve the natural environment, water resources, coastal areas, eco-system, water supply resources and cultural heritage assets, and to protect and foster fishery resources, etc.

Moreover, buildings that cannot be constructed within planned control areas according to National Land Planning and Utilization are all buildings over 4 stories, apartments among multi-unit dwellings, karaoke bars, sales facilities, business

facilities, recreational facilities, factories, etc. (Korea Expressway Corporation, 2009). In addition, buildings that cannot be constructed according to the ordinance of urban and district planning considering the regional conditions on adjacent sites include cultural and meeting facilities, religious facilities, sports facilities, accommodations, tourist resting facilities, etc.

2.3. Review of Land Use of Expressway Service Areas Through Literature review

According to the Study on Preparing the Guidelines for Development of Expressway Logistics, Transfer and Business Centers by the Ministry of Land, Infrastructure, and Transport (2014), 16 service areas were installed in agricultural and forest areas and 32 in conservation control areas, taking up approximately 20% of all. As a result of analyzing 189 special-purpose areas surveyed out of 221 service areas, 164 (87%) were in single special-purpose areas, and 25 (13%) were located in two or more special-purpose areas (Ministry of Land, Transport and Marine Affairs, 2012). In particular, all analyzed service areas are located in total 8 types of special-purpose areas, and 16 service areas are located in agricultural and forest areas, and 32 are located in natural green areas. 8 types of special-purpose areas are planned control areas, natural green areas, conservation control areas, agricultural and forest areas, production control areas, conservation green areas, natural environment conservation areas, and Type 2 general residential areas.

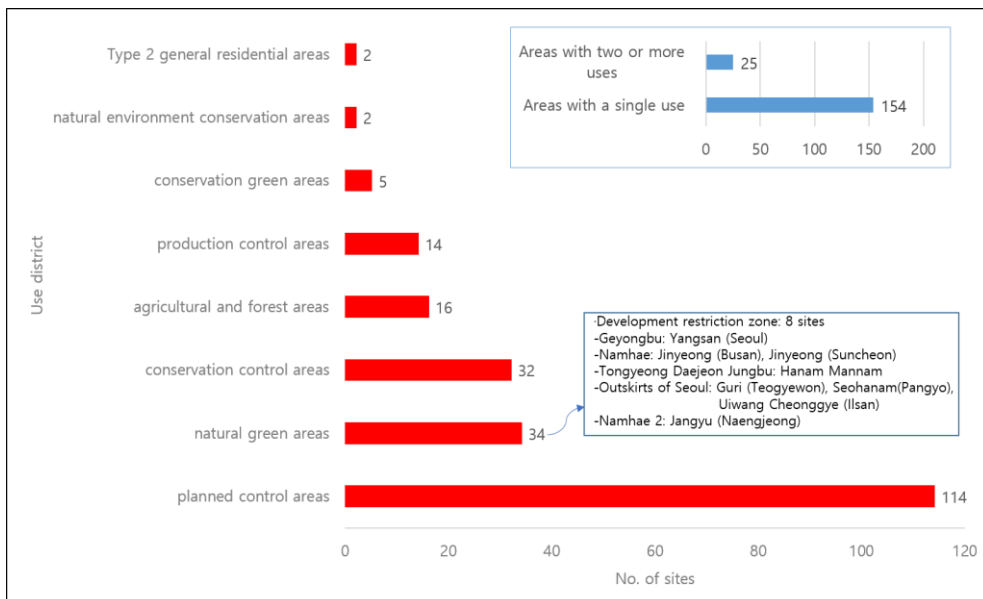


Fig. 1: Land use of existing service areas

In addition, studies on the characteristics of public-private joint development

projects and the selection of business operators were reviewed as follows. Existing studies that can improve the actual business selection method for participating companies and clients in this development project (Hong, 2015). There have been a number of studies that introduced the basic directions and strategies of private participation and suggested private participation methods (Kim and Shim, 2019). First, as a basic direction for private participation in the public sector in order to induce private participation pre-investment in infrastructure or public facilities and provision of land at an inexpensive price, various tax incentives, financial support, and licensing issues (Zhang et al, 2003). It was presented a plan to provide rather than participating as a supplier of business of the Client from the orthodox stance PF configuration consortium of business practices, business planning, financing, and compared the differences, such as construction and project management (Kim and Yoon, 2019). With similar research, LH Corporation PF through a case study of the project to study outlines the issues and implications PF issues of business of the Land Corporation and private operators on the interests of the problem and of the private sector in the excessive profit problems for , against and the role of the public sector, public interest pursued and PF interests as owners of the business and pursue PF business as lenders presented a problem to understand the need for adjustments in the public sector, such as the understanding of the land COD . Another project step-by-step improvement plan PF business 6 separated by a step conspiracy Guide Step right, operator selection process, the Convention entered into stages, construction and implementation stage, termination and damages phase of the agreement, the dispute resolution stage for such projects step-by-step improvements Presented. Prior studies have followed the existing PF by analyzing the problems presented in the case of projects presented in various aspects but the future improvements of the actual internal business in-depth issues that were not accessible. Therefore, for the business structure of the development of the case sides estate research PF to the activation it was suggestions to these problems and enable measures divided into the business structure sector and business management sector, first look at the issue of the business structure sector public sector practitioners for details on requirements regarding interests, adjusted in accordance with the position and the lack of transparency of private operators selected screening criteria and procedures , a private consortium, including the problem. and the problem with the business management sector is the design of the building. Necessity of improving the adequacy of construction and the sale of facilities. The necessity of securing the management function and the problem of the lack of operation and management system due to the liquidation of the project company were presented. In addition to this, a new model for public- private joint PF projects was proposed as the necessity of improving the business structure to revitalize the PF project, and a study that sought specific improvement measures based on the PF project currently being promoted by Korea Land Corporation. It is suggested that a new method of

transparent business selection is needed by actively inducing investors to participate in the PF business and improving evaluation standards and evaluation methods when selecting a private business. The preceding studies are considered to be meaningful in that they started with a practical discussion on the selection of a business operator, and dealt with problems and improvement measures by the characteristics of the project. Based on the above studies, in a more empirical level, this study is a major part of the business selection process to promote a harmonious development method of public and private interests by enhancing the public interest of project owners and securing profitability of private businesses, the core of public-private joint development projects. The preceding research reviewed earlier is considered to be meaningful in that it started with a practical discussion on the selection of a business operator, and dealt with problems and improvement plans for each characteristic of the project. Based on this, in a more empirical dimension, this study aims to promote a harmonious development method of public and private interests by enhancing the public interest of project owners and securing profitability of private businesses. What are the key factors in the business operator selection process, and based on these key factors, we will lead the discussion centering on the procedure for evaluating future business operators.

3. Development of the Contractor Selection Assessment System

3.1. Basic Direction for Development of the Assessment System

Contractor selection for open competition projects varies in terms of assessment fields and criteria of the subscription guide depending on the order and has the issue of not properly reflecting the characteristics of the project. To establish an assessment method for contractor selection, it is necessary to define and identify each assessment field, which in this study is carried out in the following procedures.

Table 4: Procedures for the basic direction of the assessment system

Research goals	Contents	Detailed contents	Methods
private contractor selection 방안 도출	Studying open competition assessment system for private contractor selections of other agencies	Surveying and comparatively studying assessment methods for open competition private contractor selection	Literature review
		Deriving implications to apply the existing open competition method to Haengdamdo development	Combining results

	Deriving open competition assessment methods suitable for this study	Setting the basic direction for open competition assessment methods	Evidence using cause-and-effect
		Presenting assessment guidelines and deriving open competition assessment methods	Combining results

The main purpose of this study is to first establish an assessment system for private contractor selection according to the development direction of adjacent sites on expressways and estimate the importance by assessment field, item and element to ultimately develop the assessment guidelines. Second, it is to select common assessment fields based on the cases of relevant agencies, details of the subscription guide and analysis results of previous studies and theories, and then identify detailed assessment items and elements accordingly. Third, it is to complete a final assessment system that sets the direction for development based on in-depth interviews with the order at the working level as well as experts in the relevant field.

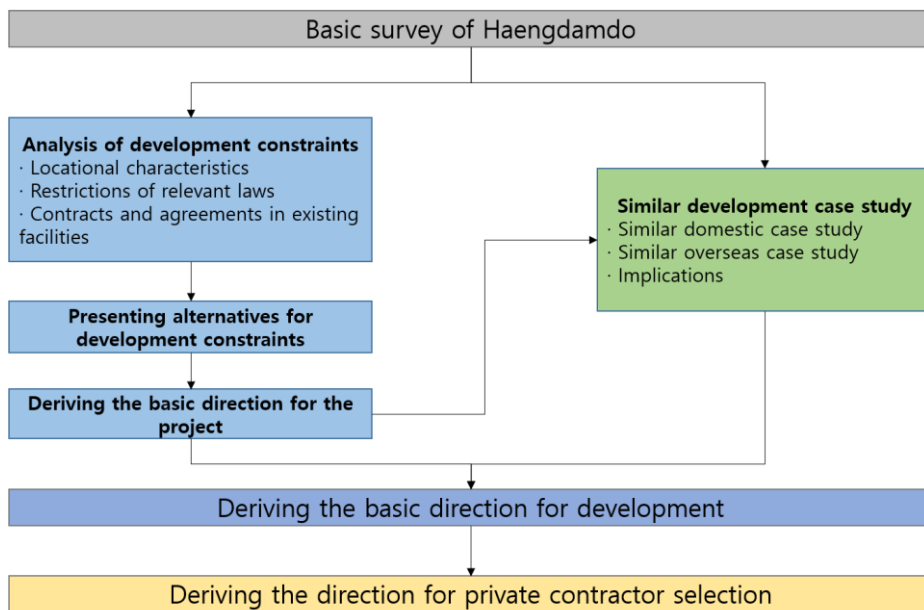


Fig. 2: Process of deriving the basic direction for development

3.2. Method to Derive Assessment Fields for Open Competition Assessment

There are many ways to derive assessment items and elements of each assessment field for contractor selection. Generally, there is the method based on cause-and-effect and evidence, as well as the method of quantification based on judgment of experts (Cho, and Kim, 2019). The former is more logical and systematic than the

latter, but in most cases the evidence is not well organized or sufficient, which is why the latter is used for supplementation. This study combines theoretical discussions, literature review and case studies of relevant agencies to come up with assessment items and elements, selects common attribute indicators that match the development direction, and verifies the validity based on advice of the orderer at the working level as well as experts by forming assessment fields for attribute indicators.

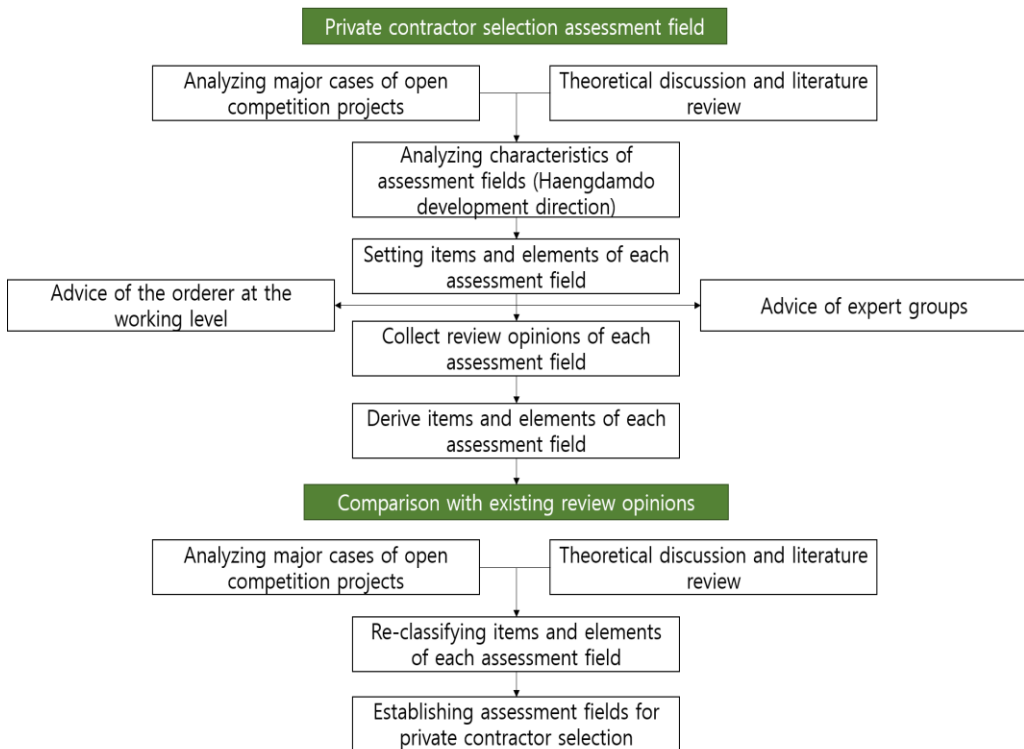


Fig. 3: Process of deriving private contractor selection assessment fields

3.3. Quantification of the Business Assessment Plan Assessment Contents and Methods

To prepare an assessment system for contractor selection, it is necessary to first analyze the assessment fields of existing open competition projects. Data analyzing open competition projects classify the project owner into public enterprises, local governments and others, encompassing all assessment fields by classifying each business type. As detailed assessment fields, we derive items and elements of each field such as existing development plan, construction plan, business (financing) plan, additional points, publicness, business planning skills of private enterprises, land bidding price, criteria for each business type, etc (Kim and Shim, 2019). In particular, we select assessment fields, items and elements by analyzing the contents of the main subscription guide for existing open competition projects, and select and

form detailed elements of each item with focus on business plans, additional points and public effects in accordance with the direction for development of Haengdamdo. We quantify the estimation of weighting through the statistical method to derive assessment field and items suitable for the target site.

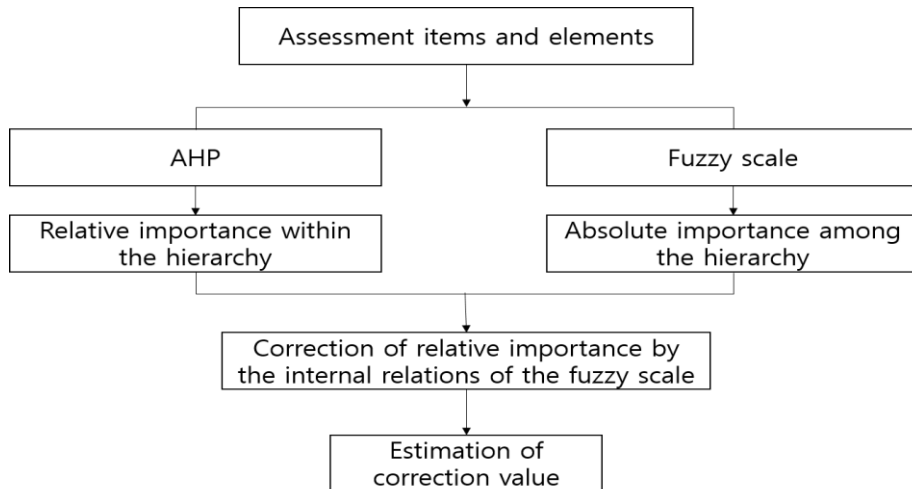


Fig. 4: Procedures for estimating importance of items and elements in each assessment field

Assessing the importance of items and elements in each assessment field for contractor selection is an important task in analyzing the assessment fields, and in particular, it is nearly impossible to clearly calculate the importance in subjective assessment in figures. In this case, experience or knowledge of experts performs a key role, and this study calculates relative importance using AHP (Analytic Hierarchy Process) that has an excellent statistical power in subjective assessment. Moreover, the subjective decision-making process is calculated through fuzzy integrals, using the concept of fuzzy scale according to the relative importance measurement of assessment items. The fuzzy scale does not have high reliability in numbers as contribution to the superordinate assessment item of individual items. On the other hand, relative importance obtained by one-on-one comparison among assessment items shows relatively high reliability. Considering these conditions, we can obtain relative importance, which is the extent to which assessment items and elements contribute to subordinate assessment fields using a fuzzy scale, calculate the correction values by reflecting the relative importance of items and elements in each field obtained from AHP, and objectify the allocation of scores.

3.4. Organization of Appraisers and the Appraisal Board

Deliberation of private contractor selection can be divided into preliminary review and main deliberation for implementation. Preliminary review deliberates the violation of guidelines and laws related to the submitted proposal according to the review guidelines of the orderer, and the result is reflected on the total score of the

business plan. Moreover, the main deliberation reviews the formation of the appraisal board (quorum) and qualifications (limitations of major in each field, etc.) as well as committee member recruitment plan, and sets the guidelines for deliberation accordingly.

3.5. Design Plan for Assessment Factors to Promote Publicness

Assessment factors to promote publicness are designed by conducting on-site surveys and listening to the opinions of the relevant local government to set the direction for development, and resources that are suitable for the regional characteristics are discovered and designed as assessment factors for public interests. In particular, additional on-site survey of resources is conducted within the region to discover resources that have regional characteristics and secure connectivity with the development direction, and development of assessment fields is comprised of additional points. Design of technology assessment and price assessment in the preliminary examination and main review provides standards in light of score distribution and weight of the analysis results of open competition projects. Then, the assessment ratio is differentiated and designed according to the direction of the research purpose, and the bidding price of tollage finalizes the scope of tollage fit for development direction (reflecting the project's opportunity costs and equity with Haengdamdo Service Area), after which the section that can be adopted flexibility depending on the type of project proposals is set up. Finally, by comparing and reviewing the ultimately proposed contractor selection method and existing method, this study confirms the utility of the assessment system and performs a simulation to check the adequacy and error range.

4. Conclusion

This study derives a development plan considering the specificity of adjacent sites on expressways such as limited development in relevant acts along with development constraints on expressways in Korea, ultimately setting the basic procedures and direction for selection of the private contractor for the project. In particular, the study was conducted with focus on the basic direction for selection of the private contractor to ultimately carry out the project, which included the development plan that guarantees publicness in addition to securing adequate profitability that meets the development purpose according to the public institution that is the main agent of development. Then we set the basic guidelines and direction for private contractor selection within the scope of efficiently using resources and guaranteeing at least certain profitability to meet the purpose of the project to develop adjacent sites on expressways. As there is a need to establish an assessment system that includes items, criteria and assessment methods for each field for private contractor selection by providing adequate alternatives and reflecting the results of strict environmental assessment and competitive business

with existing facilities, all of individuality and specificity of the target site subject to assessment must be included. Thus, for the assessment system for private contractor selection, it is necessary to ultimately set the adequate basic direction that includes the characteristics of the orderer as well as the purpose of order, which has significance in that the assessment system for most existing open competition projects was also established according to the purpose of the orderer. The results of this study are expected to be used in actual assessment by specifically deriving the assessment system for private contractor selection to specifically develop unused sites on expressways.

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