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Analyzing Characteristics of Construction Complaints with Construction Project Type

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Abstract : Conflicts in a construction project not only make negative impacts on project performance such as schedule delay or cost overrun but also require social cost to resolve the conflicts. Although the conflict needs a preemptive management because a conflict usually begins with a complaint, existing studies have focused on conflict resolution after it occurs. This study identifies and categorizes complaints which mainly appear in the construction projects. Those complaints were evaluated and quantified in terms of occurrence frequency and potential to conflict through a questionnaire survey with industry experts. Using the survey results, this study examines the characteristic of complaints in linear project and clustered project, and analyzes what kind of complaints occur by project type. As the results, this study derives the complaints with high potential to the conflicts that should be managed first during managing a construction project in each project type.

Keywords : Public Conflict, Complaint, Complaint Management, Conflict Management, Public Construction Project

1. Introduction

1.1 Research background

Various conflicts such as labor management conflicts, environmental conflicts, conflict between social strata, ideological conflicts, and regional conflicts are occurring as society diversifies and decentralizes due to rapid economic growth, democratization, and implementation of local autonomy in Korea (Kim, 2019). In particular, construction projects have a large economic and social effect because of their large-scale, and the complexity of construction projects can lead to conflicts due to conflicts of interest (Doo, 2016). Conflicts between stakeholders, such as owner, contractor, and local residents, cause long-term delays, resulting in cost overrun in construction projects. Even conflicts lead to unnecessary social costs, such as lawsuits (Lee, 2012; Moon & Jo, 2018).

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Conflicts between local residents, environmental groups, etc, and project participants generally arise from complaints. Complaints are actions of local residents or civic groups that are dissatisfied with the project or request improvements. If the complaint is not properly corrected or the response to the complaint is unsatisfactory, it extends to conflict (Oppong, 2021). Therefore, integrated management of conflicts and complaints is required to promote construction projects. Currently, researches about conflict management to prevent or manage them are increasing, but they mainly focus on social phenomenon analysis. Conflict researches related to construction projects were mostly conducted in the public administration and sociology. In addition, it is approached from not the perspective of preemptive management but post management. Conflicts often arise from complaints and expand to social conflicts. Therefore, conflict management should be managed from the occurrence of complaints. Therefore, this study aims to identify the complaints that occur in construction projects and to understand the relationship between complaints and conflicts through quantitative analysis of complaints that expand to conflicts depending on the type of project.

1.2 Research methodology

The research scope and method are as follows. First, complaint factors including conflict factors were derived through a literature review. Second, based on the derived complaint factors, a survey was made on the frequency and the potential of complaints. From March 15, 2021 to March 22, 2021, a survey was conducted targeting experts in the field of architecture and civil engineering. Third, an independent t-test was conducted by dividing the types of construction projects into linear projects and clustered projects according to morphological classification.

1.3 Literature review

Since construction projects are carried out over a certain period while forming various interests in the surrounding environment, there are many complaints (Doo, 2016). Complaints are causing cost overrun and schedule delay in a significant number of construction projects, which often cause great damage to not only the contractor but also the owner (Moon & Jo, 2018). In addition, when complaints occur, if appropriate measures are not presented, it may intensify into conflict (Olander & Landin, 2008).

To solve these problems, many studies have been conducted to effectively deal with complaints. Bemmels and Foley (1996) analyzed complaint handling theory, process, and causes in five areas based on researches published over the past decade. Styhre (2010) judged complaints in construction projects as a functional mechanism with communities, criticism, and uncertainties. Therefore, the functions and roles of complaint culture were analyzed in three aspects. Goins and Moezzi (2013) conducted an analysis based on complaints occurring in commercial buildings, and derived an effective complaint handling process. Carretero-Ayuso et al. (2017) focused on the final decree of the case sent to the court. Before completing the design, a centralized database was built by classifying and analyzing types that could identify problem areas for complaints. Recently, a method of analyzing unstructured data has been used to resolve complaints. Min et al. (2019) suggested a network map through text mining and network analysis for environmental complaints to better understand the information generated by citizens. Hong et al. (2020) determined that damage caused by environmental pollutants from construction projects causes complaints from local residents. Therefore, they developed a model that optimally predicts complaints based on the oversampling method to minimize complaints.

Previous studies have analyzed complaints in various aspects to respond to complaints. However, without considering the characteristics of complaints, they analyzed or approximate countermeasures were derived. In this research, the characteristics of complaints were dealt with in terms of the potential to conflict and the frequency of occurrence. This research was conducted to identify the relationship between complaints and conflicts through quantitative analysis from complaints factors.

2. Characteristics of Complaints in Construction Projects

2.1 Derivation of complaint factors

In this research, the complaint factors in construction projects were investigated and classified through a literature review. Kwon and Son (2006) analyzed construction complaints in Seoul and derived 25 factors. Kang et al. (2008) classified construction complaints in Daegu into 6 cause types. Carretero -Ayuso et al. (2017) derived 92 complaints from construction projects in Spain, and Hussain et al. (2017) classified the causes of construction project delays in Pakistan into 26 categories based on economical and social aspects. Moon and Jo (2018) classified 37 types of complaint factors in construction projects. Lee and Choi (2020) classified environmental complaints occurring in Namyangju City into 30 categories, and Hong et al. (2020) derived 18 reasons for environmental complaints in construction projects. In this research, major complaints in construction projects were classified into five categories based on the complaint types derived from previous studies 〈Table 1〉.

First, it is a Residents' dissatisfaction for facilities and projects. Complaints such as complaints about the project, inconveniences of public facilities, project feasibility study, and environmental impact assessment, are included in this category. There are also complaints such as the demand of rest and green areas, expansion

of sports facilities, and improvement of inconvenience in using public facilities, which local residents demand as compensation for construction. Re-investigation of project feasibility study, re-investigation of environmental impact assessment, and dissatisfaction and opposition for contractors are complaints that demand re-promotion of the project due to low resident trust. Complaints related to route or location selection, such as NIMBY (Not In My Back Yard) and PIMFY (Please In My Front Yard), are also included.

Second, due to the lack of information for projects, it is a complaint about information promotion and guidance about the project from local residents. There are complaints from residents requesting additional presentations because public hearings or briefings for residents have not been sufficiently conducted. In addition, complaints caused by insufficient construction information such as construction sign, period, section, proceedings, and guidance of detour, correspond to this category.

Third, these complaints are related to compensation for human and material damages caused by construction projects. Complaints requesting compensation for damages such as cracks, ground subsidence, and damage to underground pipes due to excavation work, and complaints related to the right to sunlight are also included. In addition, complaints that indirectly affect economic problems such as obstacles and residual land problems, land price declined due to damaged image are also included.

Fourth, complaints related to environmental damage, such as air pollution, water pollution, and pollution caused by construction projects. Compensation for damage caused by noise, vibration, and dust is included, and complaints that occur when local residents are directly damaged by environmental problems caused by construction are included. In addition, civic and organizations oppose harmful facilities that cause the destruction of the surrounding ecosystem.

Lastly, it is a complaint related to safety damage. This includes concerns about safety accidents that may occur during construction work and countermeasures related to damage. Residents near the construction site can request safety measures against flooding and landslides caused by floods or rainfall, and can request the installation of safety-related facilities such as temporary pedestrian roads.

Table 1. Complaint factors in the construction projects

Category	Complaint Factor
Residents' dissatisfaction for facilities and projects	Rest and green areas
	Expansion of sports facilities
	Inconvenience of using public facilities
	Re-investigation of project feasibility study
	Re-investigation of environmental impact assessment
	Dissatisfaction and opposition for contractors
	NIMBY (Not In My Back Yard)
	PIMFY (Please In My Front Yard)
	Change in the technology and methods
Lack of information for projects	Absence and lack of presentation for residents
	Residents'participation in presentation for residents
	Installation a construction sign
	Guidance on construction period & section
	Report on the proceedings
	Guidance on detour
Human and material damages	Compensation for building crack and ground subsidence by excavation work
	Compensation for damage to the underground pipe
	Compensation for infringement of the right to sunlight and view
	Compensation for obstacles and residual land
	Demand for livelihood support and countermeasures
	Compensation for land price declined due to damaged image
	Compensation for falling sales of local business
Environmental damages	Countermeasures against air pollution
	Countermeasures against water pollution
	Contamination around construction sites by construction machinery
	Lower ground water level and depletion
	Environmental issues raised by civic or organizations
	Electromagnetic waves and radioactivity generated by facilities
	Compensation for damages caused by dust, noise, vibration
Safety damages	Draining plan for flooding near facilities
	Spills of soil due to rainfall
	Countermeasures for the collapse of temporary buildings according to rainfall
	Traffic safety facilities
	Safety measures to prevent falling rocks
	Temporary pedestrian road

2.2 Project classification

The characteristics of complaints and conflicts appear differently, since public construction projects have different impacts on stakeholders and the surrounding environment depending on the type. In previous studies, the process of conflict was analyzed by categorizing them

into preferred or non-preferred facilities, facilities type (transportation, water supply, sewerage, energy, etc) (Paek, 2002; Eun, 2011; Cho, 2012; Lee, 2013). In general, non-preferred facilities such as power plants and landfills cause conflicts related to NIMBY, such as environmental damage and safety damage, while preferred facilities cause PIMFY conflicts to build facilities for regional development.

In this study, the size of the construction project, type of work, preference/non-preference, and other influences on the project were applied as a morphological classification that can be approached from various perspectives. According to the morphological classification, projects are divided into linear projects and clustered projects. A linear project is defined as a stretched line-shaped facility such as a road, railroad, or water and sewage pipe. The cluster project is defined as covering the point facility located in a single area and the surrounding land included in the point facility. Representative types of clustered projects include water and sewage treatment plants, plants, and complexes.

2.3 Classification of complaint characteristics

The characteristics of complaints for the structural analysis of complaints were classified into the potential to conflict and frequency. When complaints occur, appropriate responses are not made or local residents continue to express dissatisfaction, which intensifies into conflict. Depending on the complaint factors, the potential to conflict differs. In order to preemptively manipulate conflict, it is necessary to prioritize complaints with high potential. Complaints that frequently occur even if the potential to conflict is not high can be difficult to respond and affect project management. In this study, potential and frequency were evaluated on a 5-point Likert scale, and if the potential was high or occurred frequently, it was evaluated as 5 points (very high).

3. Complaint Characteristics Analysis (Results)

3.1 Data collection

The survey was distributed to Korean construction workers, and a total of 137 responses were collected

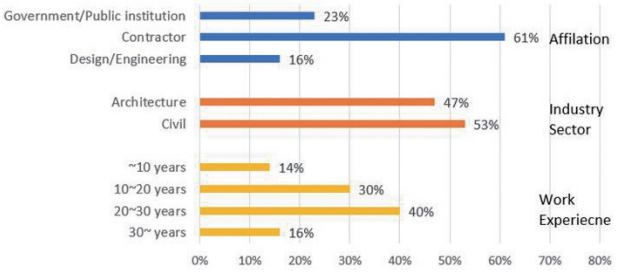

Fig. 1. Distribution of Survey respondents

through online and offline surveys 〈Fig. 1〉. As for the affiliation of the respondents to the survey, contractors accounted for the most with 61%, Government/Public institutions accounted for 22%, and design/engineering accounted for 16%. By industry, civil accounted for 53% and architecture accounted for 47%, and the average career period of the respondents was 20 years.

Prior to analyzing the characteristics of complaints, a reliability analysis was conducted to ensure consistency in the survey response results. Cronbach's alpha was calculated by dividing the potential and the frequency according to the type of construction project. All results were 0.7 or higher, which was judged to be a sufficiently reliable survey response result.

Table 2. Reliability analysis

Cronbach α / Category	Linear Project		Clustered Project	
	Potential	Frequency	Potential	Frequency
Residents' dissatisfaction for facilities and projects	0.764	0.792	0.864	0.845
Lack of information for projects	0.753	0.733	0.851	0.845
Human and material damages	0.843	0.807	0.833	0.829
Environmental damages	0.834	0.820	0.819	0.811
Safety damages	0.861	0.837	0.860	0.856

3.2 Characteristic analysis of complaints

Civil complaints were divided into five categories to analyze the impact of civil complaints on construction projects, and each category was named as residents' requirements for facilities and projects, lack of project information, human and material damage, environmental damage, and safety damage. In addition, each civil complaint category was subdivided and classified into a total of 35 detailed civil complaints. To analyze the impact of the construction project from various perspectives, it

was classified into a linear project and a clustered project according to the morphological classification. SPSS was used to analyze the potential of complaints and the impact on the frequency of complaints according to the project type. An independent sample t-test was performed to analyze the difference between linear and clustered projects in the complaints that affect the potential and the frequency of complaints at the significance level of 0.05 or less. In addition, Levene's test for equality of variance was performed, including cases where equal variance was not assumed at the significance level of 0.05 or less 〈Table 3, 4〉.

3.2.1 Potential for complaint extend to conflict

Among the complaints related to residents' dissatisfaction for facilities and projects, NIMBY (M=3.82, SD=1.03), dissatisfaction and opposition for contractors (M=3.58, SD=0.89), and PIMFY (M=3.56, SD=1.20) showed high potential in linear projects. High potential in the clustered project were dissatisfaction and opposition for contractors (M=3.67, SD=1.16), NIMBY (M=3.45, SD=1.12), and PIMFY (M=2.95, SD=1.06). Complaints with a statistically significant difference in the two types were re-investigation of project feasibility study [t(153)=2.008, p=0.047], re-investigation of environmental impact assessment [t(135)=2.966, p=0.004], PIMFY [t(134)=3.030, p=0.003]. In common, it was found that the potential was higher in linear projects than in clustered projects. Compared to clustered projects, the scope of construction is relatively wide, so it can be seen that linear projects with many related stakeholders are likely to intensify from complaints to conflicts.

Among the lack of Information for projects, complaints with a high potential were the absence and lack of presentation for residents (M=2.68, SD=1.05), residents' participation in presentation for residents (M=2.68, SD=0.98), and guidance on detour (M=2.18, SD=1.02) in linear projects. In the clustered project, residents' participation in presentation for residents (M=2.74, SD=1.15), absence and lack of presentation for residents (M=2.64, SD=1.16), and guidance on detour (M=2.20, SD=0.91) the potential was high. In both project types, the potential was low with no difference. Since these complaints can be resolved with a simple response in most projects, they are unlikely to intensify into conflicts.

Among the complaints related to human and material damages, complaints with a high potential include compensation for building crack and ground subsidence by excavation work (M=3.68, SD=0.98), compensation for infringement of the right to sunlight and view (M = 3.59, SD = 1.09), and compensation for obstacles and residual land (M = 3.52, SD = 1.09) in the linear project. In the clustered project, compensation for building crack and ground subsidence by excavation work (M=3.52, SD=1.24), compensation for infringement of the right to sunlight and view (M=3.61, SD=1.13), and compensation for damage to the underground pipe (M=3.02, SD=1.16) showed high potential. Complaints with statistically significant differences in the two types are compensation for obstacles and residual land [t(131)=4.328, p=0.000], compensation for land price declined due to damaged image [t(131)=2.052, p=0.042], compensation for falling sales of local business [t(131)=2.051, p=0.042]. In common, it was found that the potential was higher in linear projects than in clustered projects. As people's awareness of property rights has recently increased, discussions on compensation for promoting public projects are becoming more active. Therefore, it is said that the linear project, which starts construction before the completion of securing the project site, is more likely to intensify from complaints to conflict than clustered projects.

Among the complaints for environmental damages, Compensation for damages caused by dust, noise, vibration (M=3.84, SD=0.81), environmental issues raised by civic or organizations (M=3.68, SD=0.93), and lower ground water level and depletion (M=3.11, SD=0.92) were highly potential. Complaints with a high potential in clustered projects are compensation for damages caused by dust, noise, vibration (M=3.63, SD=1.17), environmental issues raised by civic or organizations (M=3.27, SD=1.13), and contamination around construction sites by construction machinery (M=2.95, SD=1.097). In addition, lower ground water level and depletion [t(126)=2.474, p=0.015] and environmental issues raised by civic or organizations [t(126)=2.049, p=0.043] were statistically significant in both project types. There is a significant difference, and it was found that linear projects have more highly potential than

Table 3. Potential of complaint in construction projects

Complaint		Linear Project			Clustered Project			t-test		
		N	M	SD	N	M	SD	*t*	df	*p*
Residents' dissatisfaction for facilities and projects	Rest and green areas	45	2.29	0.92	92	2.38	0.92	-0.545	135	0.586
	Expansion of sports facilities	45	2.18	1.07	90	2.20	0.94	-0.124	133	0.902
	Inconvenience of using public facilities	45	2.73	1.07	91	2.40	0.91	1.814	75.75	0.074
	Re-investigation of project feasibility study	43	3.30	1.10	92	2.86	1.24	2.008	133	0.047
	Re-investigation of environmental impact assessment	45	3.42	1.06	92	2.82	1.16	2.966	135	0.004
	Dissatisfaction and opposition for contractors	45	3.58	0.89	92	3.67	1.16	-0.535	110.3	0.594
	NIMBY (Not In My Back Yard)	45	3.82	1.03	92	3.45	1.12	1.894	135	0.060
	PIMFY (Please In My Front Yard)	45	3.56	1.20	91	2.95	1.06	3.030	134	0.003
	Change in the technology and methods	45	2.69	0.97	92	2.60	1.08	0.478	135	0.633
Lack of information for projects	Absence and lack of presentation for residents	44	2.68	1.05	89	2.64	1.16	0.199	131	0.842
	Residents' participation in presentation for residents	44	2.68	0.98	89	2.74	1.15	-0.295	131	0.769
	Installation a construction sign	44	1.93	0.87	89	1.87	0.80	0.438	131	0.662
	Guidance on construction period & section	44	1.86	0.80	89	1.82	0.83	0.287	131	0.775
	Report on the proceedings	44	1.86	0.80	89	1.85	0.81	0.066	131	0.948
	Guidance on detour	44	2.18	1.01	89	2.20	0.91	-0.117	131	0.907
Human and material damages	Compensation for building crack and ground subsidence by excavation work	44	3.68	0.98	89	3.52	1.24	0.832	105.7	0.408
	Compensation for damage to the underground pipe	44	3.36	1.16	89	3.02	1.16	1.597	131	0.113
	Compensation for infringement of the right to sunlight and view	44	3.59	1.09	89	3.61	1.13	-0.077	131	0.939
	Compensation for obstacles and residual land	44	3.52	1.09	89	2.72	0.97	4.328	131	0.000
	Demand for livelihood support and countermeasures	44	2.95	1.28	88	2.66	1.11	1.369	130	0.173
	Compensation for land price declined due to damaged image	44	3.00	1.22	89	2.56	1.13	2.052	131	0.042
	Compensation for falling sales of local business	44	2.98	1.13	89	2.55	1.13	2.051	131	0.042
Environmental damages	Countermeasures against air pollution	44	2.95	1.06	84	2.81	1.17	0.690	126	0.492
	Countermeasures against water pollution	44	2.98	1.05	84	2.73	1.14	1.214	126	0.227
	Contamination around construction sites by construction machinery	44	2.80	0.98	84	2.95	1.10	-0.797	126	0.427
	Lower ground water level and depletion	44	3.11	0.92	84	2.64	1.07	2.474	126	0.015
	Environmental issues raised by civic or organizations	44	3.68	0.93	84	3.27	1.13	2.049	126	0.043
	Electromagnetic waves and radioactivity generated by facilities	43	2.51	1.30	82	2.83	1.27	-1.322	123	0.189
	Compensation for damages caused by dust, noise, vibration	44	3.84	0.81	84	3.63	1.17	1.192	116.7	0.236
Safety damages	Draining plan for flooding near facilities	44	3.16	0.81	84	2.67	1.06	2.941	126	0.008
	Spills of soil due to rainfall	44	3.20	0.85	84	2.71	1.05	2.674	126	0.008
	Countermeasures for the collapse of temporary buildings according to rainfall	44	2.98	1.00	84	2.58	1.11	2.037	95.84	0.044
	Traffic safety facilities	44	2.82	0.90	84	2.55	1.01	1.494	126	0.138
	Safety measures to prevent falling rocks	44	2.84	0.99	84	2.49	1.05	1.846	126	0.067
	Temporary pedestrian road	44	2.84	1,01	84	2.70	1.12	0.688	126	0.493

clustered projects. This is because the linear project is distributed linearly and widely compared to the cluster project, so various environmental complaints are not easily resolved. This is because the linear project has more difficulties in managing various environmental complaints as the area of construction project is widely distributed compared to the cluster project.

Among the complaints related to safety damages, complaints with a high potential in linear projects are spills of soil due to rainfall (M=3.20, SD=0.85), draining plan for flooding near facilities (M=3.16, SD= 0.81), and countermeasures for the collapse of temporary buildings according to rainfall (M=2.98, SD=1.00). Complaints with a high potential in the clustered projects are spills of soil due to rainfall (M=2.71, SD=1.05), temporary pedestrian road (M=2.70, SD=1.12), and draining plan for flooding near facilities (M=2.67, SD=1.06). Complaints with statistically significant differences in the two types are draining plan for flooding near facilities [t(126)=2.941, p=0.008], spills of soil due to rainfall [t(126)=2.674, p=0.008], and countermeasures for the collapse of temporary buildings according to rainfall [t(95.84)=2.037, p=0.044]. The potential is higher in linear projects than in clustered projects. This is seen to be because the linear project is mainly constructed in riverside areas such as forests, farms, so that complaints with damage from rainfall occur frequently compared with cluster projects.

Table 4. Frequency of complaint in construction projects

Complaint		Linear Project			Clustered Project			t-test		
		N	M	SD	N	M	SD	*t*	df	*p*
Residents' dissatisfaction for facilities	Rest and green areas	45	2.31	0.70	92	2.40	0.97	-0.625	116.1	0.533
	Expansion of sports facilities	45	2.04	0.90	91	2.18	0.93	-0.785	134	0.434
	Inconvenience of using public facilities	45	3.07	0.84	91	2.77	1.07	1.777	108.7	0.078
	Re-investigation of project feasibility study	44	1.91	0.83	92	2.05	0.86	-0.935	134	0.352
	Re-investigation of environmental impact assessment	45	2.27	1.03	92	2.02	0.85	1.473	135	0.143
	Dissatisfaction and opposition for contractors	45	3.09	1.10	92	3.53	0.98	-2.391	135	0.018
	NIMBY (Not In My Back Yard)	45	3.07	1.05	92	2.88	1.05	0.976	135	0.331
	PIMFY (Please In My Front Yard)	45	2.91	1.15	92	2.48	0.98	2.299	135	0.023
	Change in the technology and methods	45	2.62	1.01	92	2.29	1.00	1.803	135	0.074
Lack of information for projects	Absence and lack of presentation for residents	44	3.07	1.02	89	3.01	1.04	0.299	131	0.765
	Residents' participation in presentation for residents	44	3.09	0.94	89	3.19	1.00	-0.555	131	0.580
	Installation a construction sign	44	3.18	1.15	89	2.87	1.06	1.580	131	0.117
	Guidance on construction period & section	44	3.14	1.07	89	2.75	1.05	1.973	131	0.051
	Report on the proceedings	44	2.95	1.08	89	2.78	0.95	0.979	131	0.330
	Guidance on detour	44	2.91	1.07	89	2.89	0.87	0.123	131	0.902
Human and material damages	Compensation for building crack and ground subsidence by excavation work	44	3.32	1.03	89	3.36	1.11	-0.207	131	0.836
	Compensation for damage to the underground pipe	44	2.73	1.00	89	2.63	0.92	0.562	131	0.575
	Compensation for infringement of the right to sunlight and view	44	2.86	1.15	89	3.04	1.15	-0.856	131	0.394
	Compensation for obstacles and residual land	44	3.86	0.93	89	2.75	1.04	6.011	131	0.000
	Demand for livelihood support and countermeasures	44	2.61	1.19	88	2.43	1.12	0.861	130	0.391
	Compensation for land price declined due to damaged image	44	2.23	1.05	89	2.20	1.07	0.128	131	0.899
	Compensation for falling sales of local business	44	2.66	1.12	89	2.49	1.13	0.794	131	0.429
Environmental damages	Countermeasures against air pollution	44	3.09	0.96	84	2.79	1.09	1.568	126	0.119
	Countermeasures against water pollution	44	2.93	1.00	84	2.70	1.00	1.231	126	0.221
	Contamination around construction sites by construction machinery	44	3.27	1.04	84	3.37	1.13	-0.471	126	0.639
	Lower ground water level and depletion	44	2.43	0.97	84	2.29	0.87	0.864	126	0.389
	Environmental issues raised by civic or organizations	44	3.25	0.94	84	3.29	1.17	-0.175	126	0.861
	Electromagnetic waves and radioactivity generated by facilities	44	2.00	1.10	92	2.28	1.10	-1.305	124	0.194
	Compensation for damages caused by dust, noise, vibration	44	4.16	0.81	84	3.77	1.16	2.202	115.9	0.030
Safety damages	Draining plan for flooding near facilities	44	3.32	0.96	84	2.58	1.07	3.830	126	0.000
	Spills of soil due to rainfall	44	3.55	0.90	84	2.90	1.04	3.468	126	0.001
	Countermeasures for the collapse of temporary buildings according to rainfall	44	2.57	1.09	84	2.50	1.09	0.336	126	0.737
	Traffic safety facilities	44	3.59	0.90	84	3.14	1.02	2.458	126	0.015
	Safety measures to prevent falling rocks	44	2.84	0.94	84	2.70	1.12	0.703	126	0.484
	Temporary pedestrian road	44	3.27	1.21	84	3.17	1.10	0.502	126	0.617

3.2.2 Frequency of complaints occurrence

Among the complaints of Residents' dissatisfaction for facilities and projects, complaints with high frequency in linear projects were dissatisfaction and opposition for contractors (M=3.07, SD=1.10), inconvenience of using public facilities (M=3.07, SD= 0.84), and NIMBY (M=3.07, SD=1.05). Complaints that occur frequently in clustered projects are dissatisfaction and opposition for contractors (M=3.53, SD=0.98), NIMBY (M=2.88, SD=1.05), and change in the technology and methods (M=2.29, SD=1.00). Complaints with statistically significant differences between the two types were found to be dissatisfaction and opposition for contractors [t(135)=-2.391, p=0.018] and PIMFY [t(135)=2.299, p=0.023]. This difference appears to be due to the comparatively linear projects including a lot of preferred facilities such as roads and railroads, and the clustered projects include a lot of non-preferred facilities such as plants and water and sewage treatment facilities.

Among complaints related to lack of information for projects, in linear projects, installation a construction sign (M=3.18, SD=1.15), guidance on construction period & section (M=3.14, SD=1.07), and residents' participation in presentation for residents (M=3.09, SD=0.94) appeared to have a high frequency. In the clustered projects, residents' participation in presentation for residents (M=3.19, SD=1.00), absence and lack of presentation for residents (M=3.01, SD=1.04), and guidance on detour

(M=2.89, SD=0.87) found to have a high frequency. In both project types, the frequency showed high values, and there was no difference. Since complaints related to lack of project information are common complaints that occur in most construction projects, there is no difference between linear projects and clustered projects.

Among human and material damages complaints, complaints that high frequency in linear projects are compensation for obstacles and residual land (M=3.86, SD=0.93), compensation for building crack and ground subsidence by excavation work (M=3.32, SD=1.03), and compensation for infringement of the right to sunlight and view (M=2.86, SD=1.15). Complaints that high frequency in clustered projects include compensation for building crack and ground subsidence by excavation work (M=3.36, SD=1.11), compensation for infringement of the right to sunlight and view (M=3.04, SD=1.15), compensation for obstacles and residual land (M=2.75, SD=1.04). Complaints with a statistically significant difference between the two types were the compensation for obstacles and residual land [t(131)=6.011, p=0.000], and complaints occurred more frequently in the linear projects than in the clustered projects. It can be seen that complaints related to compensation often occur because the linear project has a wider project scope than the clustered project and there are many related stakeholders.

Among the complaints related to environmental damage, in linear projects, compensation for damages caused by dust, noise, vibration (M=4.16, SD=0.81), contamination around construction sites by construction machinery (M=3.17, SD=1.04), and environmental issues raised by civic or organizations (M=3.25, SD=0.94) appeared to have a high frequency. In the clustered project, compensation for damages caused by dust, noise, vibration (M=3.77, SD=1.16), contamination around construction sites by construction machinery (M=3.37, SD=1.13), and environmental issues raised by civic or organizations (M=3.29, SD=1.17) appeared to have a high frequency. Complaints with a statistically significant difference between the two types of projects were compensation for damages caused by dust, noise, vibration [t(115.9)=2.202, p=0.030], and the frequency was higher in the linear project than in the clustered project. This is because that various environmental complaints frequently occur because the construction scope is linearly and widely distributed.

Among complaints for safety damages, complaints that high frequency in linear projects are traffic safety facilities (M=3.59, SD=0.90), spills of soil due to rainfall (M=3.55, SD=0.90), and draining plan for flooding near facilities (M=3.32, SD=0.96). Complaints that high frequency in clustered projects are temporary pedestrian road (M=3.17, SD=1.10), traffic safety facilities (M=3.14, SD=1.02), and spills of soil due to rainfall (M=2.90, SD=1.04) appeared. Complaints with statistically significant differences in the two types are draining plan for flooding near facilities [t(126)=3.830, p=0.000], spills of soil due to rainfall [t(126)=3.468, p=0.001], and traffic safety facilities [t(126)=2.458, p=0.015]. In these complaints, linear projects have a higher frequency than clustered projects. These complaints are relatively wider than cluster projects, so it seems that many safety-related complaints occur in linear projects with many related stakeholders.

4. Conclusions

In this study, construction projects were classified into linear projects and clustered projects, and the potential conflict and the frequency of occurrence of complaints in construction projects were analyzed. The survey of construction workers was conducted on complaint factors classified into five fields from literature review, and differences according to project characteristics were analyzed through an independent sample t-test.

Overall, the frequency of complaints for residents' dissatisfaction for facilities and projects was low regardless of the project type. However, because the linear project has a wide range and many local residents, its potential is higher than that of the cluster project. There were significant differences in the re-investigation of project feasibility study, re-investigation of environmental impact assessment, and PIMFY. In particular, in the PIMFY, not only the potential but also the frequency showed significant differences. Regarding lack of information for projects, which is common in most construction sites, the frequency was slightly higher regardless of the project type, with low

potential. Complaints about human and material damages are often related to direct compensation for damages incurred during construction. Linear projects with a wide range of projects appear to be high in both the frequency and potential of complaints. In particular, both the frequency and the potential in compensation for obstacles and residual land show a significant difference between the two types. Most complaints related to environmental damages do not show a significant difference between project types in terms of frequency. However compensation for damages caused by dust, noise, vibration showed a significant difference between linear and clustered projects. Although the potential is mostly low, but environmental issues raised by civic or organizations are high in linear projects and show a significant difference compared to clustered projects. As for safety damages, the linear project showed a high frequency and a high potential. Draining plan for flooding near facilities and spills of soil due to rainfall showed a significant difference when comparing linear and clustered, and linear projects were high.

In this study, it was able to identify complaints that could extend to conflicts and should be managed with priority by identifying the potential and the frequency of complaints in construction projects. Construction projects may have different characteristics of conflicts depending on the type of construction, but this study has limitations in that they are classified only into linear projects and clustered projects. However, it is meaningful in that complaints, which were not considered in previous studies, were considered as the root of conflict, and quantitative characteristics of complaints were derived. In future research, construction projects will be classified into detailed types such as roads, railways, ports, plaints, etc. In addition, the relationship between complaints and conflicts will be analyzed by conducting an ISA analysis, with considering not only the potential and frequency but also their impact on project performance, such as construction cost and construction period.

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References

Bemmels, B., and Foley, J.R. (1996). "Grievance procedure research: A review and theoretical recommendations." *Journal of Management*, 22(3), pp. 359-384.

Carretero-Ayuso, M.J., Moreno-Cansado, A., and de Brito, J. (2018). "General survey of construction-related complaints in recent buildings in Spain." *International Journal of Civil Engineering*, 16(12), pp. 1781-1796.

Cho, S.B. (2012). "A Research on Solutions and Cause relate to the Conflict of Construction for Power Transmission Facilities : A Case Study on the pass area of Milyang-city in South Korea." *Journal of Public Society*, 2(2), pp. 128-168

Doo, S.K. (2016). "A Study on the Reasonable public greivances Process of Construction Projects." *Construction Issue Focus*, 26.

Eun, J.H. (2011). "Military Bases Siting Conflict Analysis: Study of Contrasting Through Discourse Analysis." *Korean Public Administration Review*, 45(4), pp. 55-85

Goins, J., and Moezzi, M. (2013). "Linking occupant complaints to building performance." *Building Research & Information*, 41(3), pp. 361-372.

Hong, J., Kang, H., and Hong, T. (2020). "Oversampling-based prediction of environmental complaints related to construction projects with imbalanced empirical-data learning." *Renewable and Sustainable Energy Reviews*, 134, 110402.

Hussain, S., Zhu, F., Ali, Z., and Xu, X. (2017). "Rural residents' perception of construction project delays in Pakistan." Sustainability, 9(11), 2108.

Kang, C.G., Lee. J.Y., and Ha, J.M. (2008). "A Study on the Analysis of Change and Settlement Status of Civil Appeals in Building Construction" *Journal of the Architectural Institute of Korea Planning & Design*, 24(6), pp. 173-180.

Kim, G.N. (2019). "A Study on the Improvement of Construction Claims and Disputes" *Korean Journal of Construction Legal Affairs*, 5, pp. 1-42.

Kwon, J.S., and Son, C.B. (2006). "A Characteristic Analysis of Civil Appeals in Construction Project" *Proceedings of the Korean Institute of Construction Engineering and Management*, pp. 259-263.

Lee, G.W. (2012). "In Search of a Better Resolution of Public Disputes in Korea Society." *Research Institute for*

Coexistence & Collaboration, 1(1), pp. 69-102.

Lee, J.H., and Choi, H. (2020). "An analysis of public complaints to evaluate ecosystem services." *Land*, 9(3), p. 62.

Lee, Y.H. (2013). "A Study on the Cause and Resolution of Public Conflicts." *Korean Public Management Review*, 27(1), pp. 1-26.

Min, K., Jun, B., Lee, J., Kim, H., and Furuya, K. (2019). "Analysis of environmental issues with an application of civil complaints: The case of Shiheung City, Republic of Korea." *International journal of environmental research and public health*, 16(6), p. 1018.

Moon, S., and Jo, H. (2018). "Improvement of Design Performance for the Minimization of Public Grievances Based on a Construction Public Grievance Breakdown Structure." *Korean Journal of Construction Engineering and Management*, 19(1), pp. 12-20.

Olander, S., and Landin, A. (2008). "A comparative study of factors affecting the external stakeholder management process." *Construction management and economics*, 26(6), pp. 553-561.

Oppong, G.D., Chan, A.P., Ameyaw, E.E., Frimpong, S., and Dansoh, A. (2021). "Fuzzy evaluation of the factors contributing to the success of external stakeholder management in construction." *Journal of Construction Engineering and Management*, 147(11), 04021142.

Paek, J.S. (2002). "A Study on the Memorial Park in Seoul Metropolitan." *Korean Society and Public Administration*, 13(2), pp. 191-216.

Styhre, A. (2010). "The culture of complaint in construction: affirmative reflections on its role and function." *Construction management and economics*, 28(7), pp. 797-803.