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Research on Interface Management of General Contracting Projects

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Abstract

In recent years, EPC, as a project contracting model, has been promoted in the international and domestic markets. This mode can realize the reasonable intersection of design, procurement and construction, and can reasonably combine the three major businesses so that the whole project plan can be more optimized which is very beneficial to the management of the owner, and can effectively ensure the progress of the project construction. The achievement of the owner's cost target. However, many participants are intertwined in a system, which will inevitably bring huge challenges to managers. For example, the goals of different participants are very different, which will form the interface between organizations. Based on this problem, this paper will systematically review the interface management, find out the influencing factors of the EPC project interface management through literature, and further screen and evaluate the influencing factors through expert interviews and questionnaires, so as to obtain six influencing factors: poor information processing ability, design work ignores buildability, security incident, too much intervention by the owner, use of new technologies, new materials and new processes in construction, uncertainty and changes in the surrounding environment, and carry out variance analysis of influencing factors for different individual characteristics and obtain factors such as "too much intervention by the owner". Males have higher recognition and higher education than females. The higher the degree of recognition of this factor is, the highest degree of recognition of the supervision unit for "design work ignores constructability" is.

Keywords

EPC, Interface Management, Influence Factor

1. Introduction

The general contracting mode of the project has the advantages of realizing the integrated management of design, procurement and construction under one main body, as well as the in-depth crossover of various specialties in the process of project construction, so as to better ensure the control of the progress and cost of the project. The engineering construction industry has received more and more attention. At the same time, in the process of solving the general contracting problem, it is often found that the root cause of most problems is the improper handling of the interface problem [1]. Therefore, the effective control of the interface problem is of key significance for the smooth completion of the general contracting project. This paper studies the influencing factors of the interface management of the general contracting project. Combined with the characteristics of the general contracting project, the factors that affect the interface management of the general contracting project are analyzed by factor analysis and fuzzy evaluation to clarify the key influencing factors. And put forward improvement suggestions for key factors, which provides a good idea for the future interface management of the industry.

The advantage of the project general contracting mode is to realize the integrated management of design, procurement and construction under one main body, as well as the in-depth crossover of various specialties in the process of project construction, so as to better guarantee the construction of the project. Control the schedule and cost of the project. The engineering construction industry has been paid more and more attention. At the same time, in the process of solving the general contracting problem, it is often found that the root cause of most of the problems is improper handling of the interface problem [2]. Therefore, the effective control of the interface problem is of key significance to the smooth completion of the general contracting project. This paper studies the influencing factors of interface management of general contracting projects. Combined with the characteristics of general contracting projects, the factors affecting the interface management of general contracting projects are analyzed through factor analysis and variance analysis, poor information processing ability, design work that ignores buildability, Security incident, too much intervention by the owner, use of new technologies, new materials and new processes in construction, uncertainty and changes in the surrounding environment and six key factors affecting the interface management of general contracting projects are proposed. The project provides theoretical ideas to better solve interface problems.

2. Interface Management Theory

The definition of the word “interface” in Chinese is the contact surface between two objects or components, but the interpretation in English is not the same. Some theories believe that the interface refers to the contact surface between two objects, some scholars believe that the interface refers to the boundary or interface between entities, and some people think that the interface is the mutual relationship and function of two individuals. The term first appeared in the field of engineering technology, and it is a description of the contact surface that is naturally formed in the process of mechanical equipment. Later, it was gradually cited by scholars in other fields. To understand the interface theory from the perspective of management, its connotation Both the extension and the extension have been expanded to a certain extent, which can not only describe the connection status of different departments, but also reflect the handover status between different processes and procedures, and even describe the relationship between people and things [3]. The interface was formally introduced as an independent study in the field of management science at a relatively late time. It was originally the engineering field term "interface management" cited by scholars when they analyzed the barriers and causes of interaction between traditional R & D and marketing departments. In the early research on interface by domestic scholars, Guo, Q. *et al.* believed that improper handling of the interface between research and development (R & D), marketing and production would lead to a low conversion rate of scientific and technological achievements and a low level of innovation [4]. The Great Wall Enterprise Strategy Research Institute explained the definition of interface in the early stage, and divided the interface into three levels: inter-enterprise (interface 1), intra-departmental (interface 2), and intra-departmental unit (interface 3) [5].

3. Research on Influencing Factors

In this paper, the research methods of the influencing factors of interface management include literature research method, questionnaire survey method and factor analysis method (**Figure 1**).

3.1. Survey Design

Generation of Initial Items

The scale was developed on the basis of literature research, the results of expert interviews, and this study. The initial scale mainly includes basic demographic variables and factors that affect the interface management of EPC general contracting projects. It is mainly enumerated by looking for the influencing factors that have appeared in the literature in domestic and foreign literature databases.

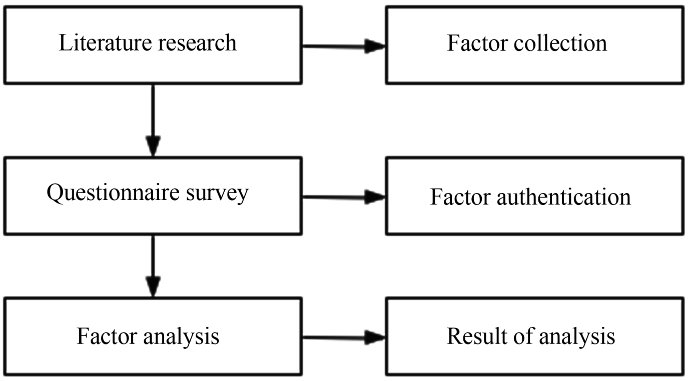

Figure 1. Technology roadmap.

Searches for "interface management" and "EPC project interface management" in Chinese databases such as CNKI and Wanfang, as well as keywords such as "interface management" and "EPC interface" in foreign language databases such as ASCE and Web of science, for relevant literature, 50 Chinese and foreign literatures were obtained by further screening the references by quickly browsing the abstracts and key words of the literature. Select 20 of them for study, extract 120 influencing factors that affect the interface management of EPC projects, and select 34 of them shown in Table 1.

The first part of the questionnaire is to make statistics on the basic characteristics of the respondents, including the respondents' gender, age, education level, work unit, job position, the number of participating EPC projects, and working years. Among them, the working years, jobs, and the number of participating EPC projects mainly refer to Liu Jiannan's research on the key success factors of UHV project interface management. In addition, it also refers to the partial design of demographic variables in the questionnaire on residents' waste management behavior by Chung *et al.* [6]. And Vu, Wang, Min, *et al.* Influence of financial factors on international general contracting projects on project schedule delay [7].

When designing the items of the second part of the evaluation of influencing factors, we mainly refer to the research of Wang and Ling [8]. At the same time, taking into account that some expressions do not conform to the habits of my country's engineering industry, some modifications have been made to the naming of processes, etc. In addition, the questionnaires of foreign scholars generally have many items, and the questionnaires are very long. Considering that the length of the questionnaires will affect the recovery rate of the questionnaires, this study conducted a preliminary questionnaire within the research group to judge the semantics of the items and the questionnaire. Fill in the comfort.

The evaluation of the influencing factors in this study adopts the 5-point Likert design, and the respondents are asked to evaluate the content of each item according to their actual situation. "2", "3" for "moderate impact", "4" for "moderate impact", and "5" for "severe impact".

3.2. Descriptive Statistical Analysis of Basic Characteristics of Samples

3.2.1. Sample Gender Analysis

According to the gender structure, there are 225 males, accounting for 82.7%, and 47 females, accounting for 17.3%. The proportion of males is significantly higher than that of females. This ratio also reflects well that there are far more male employees than females in the construction engineering industry.

3.2.2. Sample Age Analysis

In terms of age level, the group aged 25 - 35 accounted for the largest proportion, accounting for 43.4%, followed by the group aged 46 and above, accounting

Table 1. Initial influencing factors.

Serial number	Factors
1	Gender
2	Age
3	Education level
4	Type of work unit
5	Where you are working
6	Participate in the number of EPC projects
7	Working years
1	Too much intervention by the owner
2	Change more
3	The owner delays the payment of the project payment
4	Multiple majors working at the same time cause work-face conflicts
5	The construction party misunderstood the design documents
6	Use of new technologies, new materials and new processes in construction
7	Unreasonable construction schedule
8	Construction progress is delayed
9	Security incident
10	Inexperience of subcontractors
11	Lack of awareness of high-tech and smart construction
12	Incomplete design drawings
13	Errors in design drawings
14	Inadequate designer skills and experience
15	Design work ignores buildability
16	Design schedule delays
17	Unfamiliar with laws, regulations and policies
18	Ignore local resource constraints
19	Uncertainty and changes in the surrounding environment
20	The buyer's logistics management ability is poor
21	Material/equipment supply delays
22	Low contract price
23	There is no clear definition or description of the work of the interface class
24	Lack of communication between participants
25	Participants lack trust

Continued

26	Participants lack a sense of cooperation
27	Participants have different cultures or backgrounds
28	Missing or outdated information
29	Poor information processing ability
30	Insufficient information sharing
31	Organizational chao
32	Incomplete staffing
33	Lack of effective management and unified command
34	Lack of effective oversight

for 26.8%, and the two combined accounted for 70.2%. The remaining 16 - 24 years old and 36 - 45 years old accounted for 7% and 22.8% respectively. It can be seen that the respondents are mainly young and middle-aged people aged 25 - 35. On the one hand, this age group is in a stage of just graduating and career advancement, and secondly, this age group has relatively good physical fitness, can withstand the work intensity of the engineering industry, and can also bring them considerable income.

3.2.3. Sample Educational Attainment Analysis

Judging from the educational structure of the sample, there are 155 people with bachelor degree, accounting for 57% of the total sample, followed by college degree, with 59 people, accounting for 21.7%; the rest are doctor or above, master, high school and below, accounting for 7%, 18%, and 2.6%, respectively. It can be seen from this that the total proportion of bachelor degree and above is 75.7%, which shows that the current employees in the engineering industry are generally highly educated and have a relatively high cultural quality. This is due to the development of engineering technology, and more and more high-tech equipment and processes are applied in the engineering industry, so higher requirements are placed on the cultural quality of employees.

3.2.4. Sample Work Unit Type Analysis

From the distribution of the types of units where the samples are located, the most are from construction units, with a total of 128, accounting for 47.1%; followed by 31 cost consulting units, accounting for 11.4%; the rest of the owners, design units, supervision units, procurement units, government departments, For details of other consulting units, universities or scientific research institutions, and general project contractors, please refer to **Table 2**. This shows that the personnel from the construction unit far exceed other units, which is also in line with the actual construction process. In any construction project site, the personnel from the construction unit always account for the majority.

Table 2. Respondent basic information.

Feature	Category	Number of samples	Percentage
Gender	Male	225	82.7
	Female	47	17.3
Age	16 - 24	19	7
	25 - 35	118	43.4
	36 - 45	62	22.8
	≥46	73	26.8
Education level	High school and below	7	2.6
	College	59	21.7
	Undergraduate	155	57
	Master	49	18
	PhD and above	2	7
Type of work unit	Owner	26	9.6
	Construction unit	128	47.1
	Design unit	17	6.3
	Supervision unit	6	2.2
	Purchasing unit	1	0.4
	Government department	6	2.2
	Cost consulting unit	31	11.4
	Other consulting units	5	1.8
	University or research institution	16	5.9
	Project general contractor	20	7.4
	Other	16	5.9
Where you are working	Business managers	90	33.1
	Government department managers	7	2.6
	Project manager	66	24.3
	Professional technician	72	26.5
	University or research institute researchers	16	5.9
	Other	21	7.7
Participate in the number of EPC projects	0	96	35.3
	1 - 3	154	56.6
	4 - 6	10	3.7
	≥6	12	4.4

Continued

Working years	1 - 5	84	30.9
	6 - 10	38	14
	11 - 15	38	14
	≥15	112	41.2

3.2.5. Sample Job Type Analysis

From the distribution of the sample positions, there are 90 enterprise managers, accounting for 33.1%, followed by professional technicians and project managers, accounting for 26.5% and 24.3%, respectively. The rest are government department managers, researchers from universities or research institutes, and other personnel, accounting for 2.6%, 5.9%, and 7.7%, respectively. The samples came from front-line professional technicians and project managers, accounting for 83.9% in total. Such samples are directly involved in the project construction and provide good support for the authenticity of the data.

3.2.6. Quantity Analysis of Samples Participating in EPC Projects

This questionnaire survey is a factor affecting the interface management of EPC general contracting projects, so the number of respondents participating in EPC projects is investigated. It can be seen from Table 2 that 176 persons have participated in the EPC general contracting project, accounting for 64.7% of the total, and the remaining 35.3% of the surveyed persons have not directly participated in the EPC project. In addition, the largest number of people participated in 1 - 3 EPC general contracting projects, with a total of 154 people, accounting for 56.6% of the total. This shows that with the gradual promotion of the EPC general contracting model, more and more construction processes in my country use the EPC general contracting method for construction.

3.2.7. Sample Working Years Analysis

Judging from the working years of the investigators, there are 84 working years from 1 to 5 years, accounting for 30.9% of the total; More than 112 years, accounting for 41.2% of the total. According to the survey results of working years, it can be shown that those who participated in this survey are practitioners with certain work experience.

3.3. Descriptive Statistical Analysis of Influencing Factors

From Table 3, it can be seen that in the evaluation of 34 factors, the evaluation score of "1" has a lower weight among all factors, the evaluation score of "3", and "4" has a higher weight among all factors, and these scores provide support for the analysis of variance below.

After calculation, the average evaluation score of all factors is 4. The evaluation score for such factors as excessive intervention by the owner delayed payment of the project payment by the owner, incomplete design drawings, many errors in the design drawings, low contract price, lack of effective management

Table 3. Evaluation of various influencing factors.

Factors	Influence level	Frequency	Percentage	Factors	Influence level	Frequency	Percentage
Too much intervention by the owner	1	7	2.6	Ignore local resource constraints	1	12	4.4
	2	18	6.6		2	35	12.9
	3	67	24.6		3	81	29.8
	4	105	38.6		4	93	34.2
	5	75	27.6		5	51	18.8
Change more	1	13	4.8	Uncertainty and changes in the surrounding environment	1	9	3.3
	2	25	9.2		2	35	12.9
	3	76	27.9		3	97	35.7
	4	78	28.7		4	83	30.5
	5	80	29.4		5	48	17.6
The owner delays the payment of the project payment	1	14	5.1	The buyer's logistics management ability is poor	1	14	5.1
	2	23	8.5		2	42	15.4
	3	57	21.0		3	93	34.2
	4	71	26.1		4	76	27.9
	5	107	39.3		5	47	17.3
Multiple majors working at the same time cause work-face conflicts	1	13	4.8	Material/equipment supply delays	1	10	3.7
	2	43	15.8		2	40	14.7
	3	104	38.2		3	89	32.7
	4	74	27.2		4	77	28.3
	5	38	14.0		5	56	20.6
The construction party misunderstood the design documents	1	28	10.3	Low contract price	1	8	2.9
	2	47	17.3		2	24	8.8
	3	51	18.8		3	70	25.7
	4	71	26.1		4	69	25.4
	5	75	27.6		5	101	37.1
Use of new technologies, new materials and new processes in construction	1	43	15.8	There is no clear definition or description of the work of the interface class	1	9	3.3
	2	85	31.3		2	42	15.4
	3	78	28.7		3	84	30.9
	4	51	18.8		4	83	30.5
	5	15	5.5		5	54	19.9
Unreasonable construction schedule	1	14	5.1	Lack of communication between participants	1	5	1.8
	2	41	15.1		2	37	13.6
	3	76	27.9		3	85	31.3
	4	75	27.6		4	76	27.9
	5	66	24.3		5	69	25.4

Continued

Construction progress is delayed	1	14	5.1	Participants lack trust	1	11	4.0
	2	29	10.7		2	34	12.5
	3	84	30.9		3	92	33.8
	4	82	30.1		4	71	26.1
	5	63	23.2		5	64	23.5
Security incident	1	43	15.8	Participants lack a sense of cooperation	1	12	4.4
	2	27	9.9		2	31	11.4
	3	41	15.1		3	81	29.8
	4	37	13.6		4	84	30.9
	5	124	45.6		5	64	23.5
Inexperience of subcontractors	1	8	2.9	Participants have different cultures or backgrounds	1	20	7.4
	2	31	11.4		2	74	27.2
	3	77	28.3		3	93	34.2
	4	82	30.1		4	60	22.1
	5	74	27.2		5	25	9.2
Lack of awareness of high-tech and smart construction	1	16	5.9	Missing or outdated information	1	11	4.0
	2	60	22.1		2	53	19.5
	3	87	32.0		3	110	40.4
	4	71	26.1		4	57	21.0
	5	38	14.0		5	41	15.1
Incomplete design drawings	1	9	3.3	Poor information processing ability	1	12	4.4
	2	24	8.8		2	44	16.2
	3	53	19.5		3	114	41.9
	4	104	38.2		4	63	23.2
	5	82	30.1		5	39	14.3
Errors in design drawings	1	8	2.9	Insufficient information sharing	1	10	3.7
	2	20	7.4		2	52	19.1
	3	55	20.2		3	109	40.1
	4	85	31.3		4	63	23.2
	5	104	38.2		5	38	14.0
Inadequate designer skills and experience	1	8	2.9	Organizational chao	1	9	3.3
	2	30	11.0		2	34	12.5
	3	65	23.9		3	71	26.1
	4	93	34.2		4	71	26.1
	5	76	27.9		5	87	32.0

Continued

Design work ignores buildability	1	8	2.9	Incomplete staffing	1	11	4.0
	2	24	8.8		2	38	14.0
	3	78	28.7		3	84	30.9
	4	94	34.6		4	85	31.3
	5	68	25.0		5	54	19.9
Design schedule delays	1	9	3.3	Lack of effective management and unified command	1	11	4.0
	2	36	13.2		2	26	9.6
	3	73	26.8		3	59	21.7
	4	79	29.0		4	87	32.0
	5	75	27.6		5	89	32.7
Unfamiliar with laws, regulations and policies	1	14	5.1	Lack of effective oversight	1	14	5.1
	2	48	17.6		2	43	15.8
	3	95	34.9		3	84	30.9
	4	67	24.6		4	73	26.8
	5	48	17.6		5	58	21.3

and unified command, etc. exceeded 3.8 from **Table 4**. For the analysis of individual factors, factors such as delay in payment of construction costs by the owner, low contract price, many errors in design drawings, lack of effective management and unified command and other factors are rated as having the highest proportion of serious impacts. Looking at the results from the perspective of factors, it reflects that the interface management of EPC general contracting projects is seriously affected by the above factors, so it lays a foundation for the specific analysis of the influencing factors below.

4. Conclusions

4.1. Variance Analysis of Individual Characteristics and Influencing Factors

After exploratory analysis, 34 influencing factors were classified and divided into six categories of influencing factors. According to the contribution of each influencing factor, a key influencing factor was extracted from each type of factor, and the "inter-organizational information communication quality" was extracted. The "inter-organizational information communication quality" extraction factor "poor information processing ability"; "designer's work quality" extraction factor "design work neglects constructability"; "constructor's work quality" extraction factor "safety accident"; "changed" extraction factor "too much intervention by the owner"; "the use of new technologies or new materials" extraction factor "the use of new technologies, new materials, new processes in construction"; "uncertainty of the environment or resources" extraction factor "more uncertainty

Table 4. The average of each factor.

factors	Number of cases	Minimum	Maximum value	Average value
Too much intervention by the owner	272	1	5	3.82
Change more	272	1	5	3.69
The owner delays the payment of the project payment	272	1	5	3.86
Multiple majors working at the same time cause work-face conflicts	272	1	5	3.30
The construction party misunderstood the design documents	272	1	5	3.43
Use of new technologies, new materials and new processes in construction	272	1	5	2.67
Unreasonable construction schedule	272	1	5	3.51
Construction progress is delayed	272	1	5	3.56
Security incident	272	1	5	3.63
Inexperience of subcontractors	272	1	5	3.67
Lack of awareness of high-tech and smart construction	272	1	5	3.20
Incomplete design drawings	272	1	5	3.83
Errors in design drawings	272	1	5	3.94
Inadequate designer skills and experience	272	1	5	3.73
Design work ignores buildability	272	1	5	3.70
Design schedule delays	272	1	5	3.64
Unfamiliar with laws, regulations and policies	272	1	5	3.32
Ignore local resource constraints	272	1	5	3.50
Uncertainty and changes in the surrounding environment	272	1	5	3.46
The buyer's logistics management ability is poor	272	1	5	3.37
Material/equipment supply delays	272	1	5	3.47
Low contract price	272	1	5	3.85
There is no clear definition or description of the work of the interface class	272	1	5	3.48
Lack of communication between participants	272	1	5	3.61
Participants lack trust	272	1	5	3.53
Participants lack a sense of cooperation	272	1	5	3.58

Continued

Participants have different cultures or backgrounds	272	1	5	2.99
Missing or outdated information	272	1	5	3.24
Poor information processing ability	272	1	5	3.27
Insufficient information sharing	272	1	5	3.25
Organizational chao	272	1	5	3.71
Incomplete staffing	272	1	5	3.49
Lack of effective management and unified command	272	1	5	3.80
Lack of effective oversight	272	1	5	3.43

and changes in the surrounding environment". The following is a variance analysis of the six influencing factors of EPC project interface management.

4.2. Analysis of Variance between Gender and Influencing Factors

It can be seen from **Table 5** that the significance levels of the six factors are all greater than 0.05. Through the homogeneity test of variance, the gender differences are analyzed below.

From the data in **Table 6**, it can be seen that "the information processing ability is poor, the design work ignores the constructability, safety accidents occur, new materials, new technologies and new processes are used in construction, and there are many uncertainties and changes in the surrounding environment" The significance level is greater than 0.05. The significance level of "too much intervention by the owner" is lower than 0.05, indicating that the influence of this factor on the interface management of EPC projects is different for different genders. As can be seen from **Table 7**, in terms of the average score of the factor of "too much intervention by the owner", men (3.90) are significantly higher than women (3.43). Compared with males [7], the scores of female practitioners with "too much intervention by the owner" are relatively low, and they are considered to have a low degree of influence on interface management.

4.3. Variance Analysis of Educational Level and Influencing Factors

From **Table 8**, it can be seen that the significance levels of "poor information processing ability", "neglecting constructability in design work", "too much intervention by the owner", and "use of new materials, new technologies and new processes in construction" are all greater than 0.05, through the homogeneity test of variance, the following analysis of the differences in education levels.

It can be seen from **Table 9** that the significance of the factor of "too much intervention by the owner" is less than 0.05, indicating that this factor has significant differences among people with different educational levels. From **Table 10**, it can be seen that on the factor of "too much intervention by the owner", the

Table 5. Variance homogeneity test of gender.

Factors	Levine Statistics	df1	df2	Salience
Poor information processing ability	0.194	3.000	268.000	0.900
Design work ignores buildability	0.140	3.000	268.000	0.936
Security incident	2.314	3.000	268.000	0.076
Too much intervention by the owner	4.790	3.000	268.000	0.003
	0.379	3.000	268.000	0.768
Uncertainty and changes in the surrounding environment	2.451	3.000	268.000	0.064

Table 6. One-way ANOVA of gender.

Factors		Sum of squares	Degrees of freedom	Mean square	F	Salience
Poor information processing ability	Between groups	0.811	1.000	0.811	0.753	0.386
	Intragroup	290.597	270.000	1.076		
	Total	291.408	271.000			
Design work ignores buildability	Between groups	0.035	1.000	0.035	0.033	0.856
	Intragroup	289.244	270.000	1.071		
	Total	289.279	271.000			
Security incident	Between groups	2.718	1.000	2.718	1.183	0.278
	Intragroup	620.517	270.000	2.298		
	Total	623.235	271.000			
Too much intervention by the owner	Between groups	8.835	1.000	8.835	9.198	0.003
	Intragroup	259.338	270.000	0.961		
	Total	268.173	271.000			
Use of new technologies, new materials and new processes in construction	Between groups	1.467	1.000	1.467	1.176	0.279
	Intragroup	336.754	270.000	1.247		
	Total	338.221	271.000			
Uncertainty and changes in the surrounding environment	Between groups	1.344	1.000	1.344	1.267	0.261
	Intragroup	286.289	270.000	1.060		
	Total	287.632	271.000			

Table 7. Descriptive statistics of gender.

Factors	Gender	Number of cases	Average value	Standard error	Minimum	Maximum value
Too much intervention by the owner	Male	225	3.90	0.067	1	5
	Female	47	3.43	0.124	1	5
	Total	272	3.82	0.060	1	5

Continued

Security incident	Male	225	3.59	0.102	1	5
	Female	47	3.85	0.206	1	5
	Total	272	3.63	0.092	1	5
Design work ignores buildability	Male	225	3.69	0.068	1	5
	Female	47	3.72	0.157	1	5
	Total	272	3.70	0.063	1	5
Poor information processing ability	Male	225	3.29	0.069	1	5
	Female	47	3.15	0.149	1	5
	Total	272	3.27	0.063	1	5
Use of new technologies, new materials and new processes in construction	Male	225	2.64	0.076	1	5
	Female	47	2.83	0.144	1	5
	Total	272	2.67	0.068	1	5
Use of new technologies, new materials and new processes in construction	Male	225	3.43	0.069	1	5
	Female	47	3.62	0.151	1	5
	Total	272	3.46	0.062	1	5

Table 8. Variance homogeneity test of education level.

Factors	Levine Statistics	df1	df2	Salience
Poor information processing ability	0.747	4	267	0.560
Design work ignores buildability	1.176	4	267	0.322
Security incident	2.765	4	267	0.028
Too much intervention by the owner	1.613	4	267	0.171
Use of new technologies, new materials and new processes in construction	0.813	4	267	0.518
Uncertainty and changes in the surrounding environment	4.800	4	267	0.001

Table 9. One-way ANOVA of education level.

Factors		Sum of squares	Degrees of freedom	Mean square	F	Salience
Poor information processing ability	Between groups	1.292	4	0.323	0.297	0.880
	Intragroup	290.116	267	1.087		
	Total	291.408	271			
Design work ignores buildability	Between groups	7.823	4	1.956	1.855	0.119
	Intragroup	281.457	267	1.054		
	Total	289.279	271			

Continued

Security incident	Between groups	6.530	4	1.633	0.707	0.588
	Intragroup	616.705	267	2.310		
	Total	623.235	271			
Too much intervention by the owner	Between groups	12.857	4	3.214	3.361	0.010
	Intragroup	255.316	267	0.956		
	Total	268.173	271			
Use of new technologies, new materials and new processes in construction	Between groups	6.066	4	1.516	1.219	0.303
	Intragroup	332.155	267	1.244		
	Total	338.221	271			
Uncertainty and changes in the surrounding environment	Between groups	4.600	4	1.150	1.085	0.364
	Intragroup	283.032	267	1.060		
	Total	287.632	271			

Table 10. Descriptive statistics of education level.

Factors	Education level	Number of cases	Average value	Standard error	Minimum	Maximum value
Too much intervention by the owner	High school and below	7	3.86	0.340	3	5
	College	59	3.66	0.140	1	5
	Undergraduate	155	3.99	0.075	1	5
	Master	49	3.49	0.143	1	5
	PhD and above	2	3.00	0.000	3	3
	Total	272	3.82	0.060	1	5
Security incident	High school and below	7	3.57	0.719	1	5
	College	59	3.53	0.200	1	5
	Undergraduate	155	3.68	0.124	1	5
	Master	49	3.69	0.196	1	5
	PhD and above	2	2.00	0.000	2	2
	Total	272	3.63	0.092	1	5
Design work ignores buildability	High school and below	7	3.43	0.429	2	5
	College	59	3.78	0.135	1	5
	Undergraduate	155	3.79	0.081	1	5
	Master	49	3.39	0.154	1	5
	PhD and above	2	3.00	0.000	3	3
	Total	272	3.70	0.063	1	5

Continued

Poor information processing ability	High school and below	7	3.29	0.565	1	5
	College	59	3.24	0.140	1	5
	Undergraduate	155	3.28	0.081	1	5
	Master	49	3.29	0.149	1	5
	PhD and above	2	2.50	0.500	2	3
	Total	272	3.27	0.063	1	5
Use of new technologies, new materials and new processes in construction	High school and below	7	2.57	0.571	1	5
	College	59	2.47	0.144	1	5
	Undergraduate	155	2.74	0.090	1	5
	Master	49	2.73	0.154	1	5
	PhD and above	2	1.50	0.500	1	2
	Total	272	2.67	0.068	1	5
Uncertainty and changes in the surrounding environment	High school and below	7	3.43	0.685	1	5
	College	59	3.49	0.117	1	5
	Undergraduate	155	3.49	0.085	1	5
	Master	49	3.41	0.137	1	5
	PhD and above	2	2.00	0.000	2	2
	Total	272	3.46	0.062	1	5

average score is approximately inversely proportional to the increase in educational level, that is, the employees with lower educational level think that "too much intervention by the owner" has a more serious impact on interface management. From Table 2, it can be seen that 75% of the respondents have a bachelor's degree or below. This data shows that the current education level of employees in the construction industry is mostly bachelor's degree and below. Due to different learning environments, people with different education levels may be more likely to have theoretical knowledge. He has a relatively thorough understanding and will respond patiently to the owner's suggestions through his professional knowledge or experience.

4.4. Variance Analysis of Work Unit and Influencing Factors

From Table 11, it can be seen that "the ability to process information is poor", "the design work ignores the constructability", "the owner intervenes too much", "the use of new technologies, new materials, and new processes in the construction", "the unfavorable environment of the surrounding environment" The significance level of "certainty and more variation" is greater than 0.05, which is regarded as passing the homogeneity test of variance. The differences between the types of work units are analyzed below.

From Table 12, it can be seen that the significance level of the two factors of "ignoring constructability in design work" and "too much intervention by the

Table 11. Variance homogeneity test of employer.

Factors	Levine Statistics	df1	df2	Salience
Poor information processing ability	1.423[a]	9	261	0.178
Design work ignores buildability	0.661[b]	9	261	0.744
Security incident	3.179[c]	9	261	0.001
Too much intervention by the owner	0.544[d]	9	261	0.842
Use of new technologies, new materials and new processes in construction	1.836[e]	9	261	0.062
Uncertainty and changes in the surrounding environment	0.721[f]	9	261	0.690

Table 12. One-way ANOVA of employer.

Factors		Sum of squares	Degrees of freedom	Mean square	F	Salience
Poor information processing ability	Between groups	10.113	10	1.011	0.938	0.498
	intragroup	281.295	261	1.078		
	Total	291.408	271			
Design work ignores buildability	Between groups	26.110	10	2.611	2.590	0.005
	intragroup	263.169	261	1.008		
	Total	289.279	271			
Security incident	Between groups	36.268	10	3.627	1.613	0.103
	intragroup	586.967	261	2.249		
	Total	623.235	271			
Too much intervention by the owner	Between groups	22.875	10	2.287	2.434	0.009
	intragroup	245.298	261	0.940		
	Total	268.173	271			
Use of new technologies, new materials and new processes in construction	Between groups	12.016	10	1.202	0.961	0.478
	intragroup	326.205	261	1.250		
	Total	338.221	271			
Uncertainty and changes in the surrounding environment	Between groups	18.739	10	1.874	1.819	0.058
	intragroup	268.894	261	1.030		
	Total	287.632	271			

owner" is less than 0.05, indicating that these two factors have significant differences in the population of different work units. The average score of the "design work neglects constructability" supervision unit is up to 4.33, followed by the average scores of other consulting units and general engineering contractors. In an EPC project, the general contractor usually purchases the supervisory unit and the consulting unit, which is in a juxtaposed relationship with the design unit, so this type of unit is more sensitive to the factor of "ignoring constructability in design work". Finally, as the overall leader, the general contractor is at a high level of sensitivity to the work of each subcontractor. For "too much intervention by the owner", the average score of the general contractor is 4.45 and the lowest is 3. The general contractor of the project directly signs the general contract with the owner. The owner frequently intervenes in the project, which affects the progress of the project. The general contractor, as the general person in charge of the project, must bear the schedule and cost risks. Therefore, general contractors are more sensitive to this factor.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

[1] Fan, L.J. (2013) Research on Interface Management of EPC Engineering General Contracting Project. Central South University, Changsha.

[2] Diao, Z.F. and Yu, D.F. (2001) On Interface Management in Modern Enterprises. *Technological Progress and Countermeasures*, **18**, 85-86.

[3] Guan, J.C. (2000) Grey Clustering Method and Application for Evaluation of Interface Management Level. *Journal of Beihang University*, **26,** No. 4, 465-469.

[4] Guo, Q., Xu, Z.-P., Zhang, G.-F., *et al.* (2010) Comparative Analysis between the EPC Contract Mode and the Traditional Mode Based on the Transaction Cost Theory. *IEEE*, 191-195.

[5] Chung, S.-S. and Poon, C.-S. (2000) A Comparison of Waste Reduction Practices and the New Environmental Paradigm in Four Southern Chinese Areas. *Environmental Management*, **26**, 195-206. https://doi.org/10.1007/s002670010081

[6] Al-Hammad, A.-M. (2000) Common Interface Problems among Various Construction Parties. *Journal of Performance of Constructed Facilities*, **14**, 71-74. https://doi.org/10.1061/(ASCE)0887-3828(2000)14:2(71)

[7] Vu, H.A., Wang, J., Min, L., *et al.* (2015) Impacts of the Financial Factors on Schedule Delays Risk of the International Contracting Projects: Evidence from Highway BOT Projects in Vietnam. *World Journal of Engineering & Technology*, **3**, 311-319 https://doi.org/10.4236/wjet.2015.34030

[8] Wang, X.Y. and Ling, P.H. (2017) Gender Differences in Management Capability in the Construction Industry: An Empirical Study Based on the United States. *Value Engineering*, **36**, 242-244.