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# Research on supervision demand of general contracting project based on grounded theory

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**Abstract.** Urban rail transit projects have large investment, long construction period, large scale, and complex professional technology, which leads to problems such as cumbersome construction management and unclear regulatory content. Based on grounded theory, this study uses semi-structured interviews to determine the core content of project supervision: market supervision, contract supervision, and administrative supervision. This paper constructs the supervision content demand model of the urban rail transit project general contracting project, and analyzes the three types of supervision content from the perspective of the government to enhance the government's supervision awareness and optimize the supervision content.

## 1. Introduction

At present, the general contracting model is increasingly favored by countries all over the world for its ability to provide social, professional and commercial services. However, due to China's risk culture and trust environment, as well as imperfect engineering general contracting laws and regulations, there are many problems in the implementation of engineering general contracting, which need to be strengthened, especially the general contracting of rail transit projects. Because the administrative regulations and local laws, regulations and documents of the document on the supervision of rail transit engineering general contracting projects are limited, the supervision of rail transit engineering general contracting projects is insufficient, and the supervision content is not clear, so that the project progress Delays, unqualified quality, cost overruns, etc., affecting the realization of project objectives.

The application of grounded theory in this study can broaden the field of research. Some scholars have applied the relevant theories of information economics in their research, and analyzed them from two dimensions: internal supervision and external supervision. Through the game analysis method, the supervisory results and the non-supervised results are analyzed and compared respectively, and the necessity of supervision is obtained. However, the application of grounded theory in the field of general contracting supervision of rail transit engineering is almost blank. Therefore, using the grounded theory method to establish a scientific theoretical model framework, mining regulatory requirements, fill the gap in the supervision field of rail transit engineering general contracting projects, and provide theoretical basis for rail transit engineering general contracting project supervision.



## 2. Research methods and data sources

### 2.1. The research methods

To achieve the purpose of the rail transit turnkey project regulation, to accurately grasp the content of the regulation, using grounded theory method, this study using semi-structured interview data collected in the first place, and then to adjust relevant information and coding, so as to comb the logic relationship, general contracting project supervision content needs analysis of rail transit.

### 2.2. The data collection

Semi-structured interview was used to collect data in this study. The design of interview questions is divided into three levels, namely, situational introduction, core interview and in-depth interview, to explore the respondents' cognition and understanding of "the supervision content of the general contracting project of rail transit engineering". The hierarchical setting of interview questions is shown in table 1.

**Table 1.** Hierarchical setting of interview questions.

| The problem levels  | Type of problem   | Specific problems   | Setup instructions  |
|---------------------|---|---|---|
| Scene import        | Fundamental problem (understanding of the supervision status of the general contracting project of rail transit project)    | 1. What problems exist in the process of project general contracting?   | Promote the interviewees to enter the interview state quickly, and guide the interviewees to think about the development status of the general contracting project of rail transit project. |
|                     |   | 2. Are there any problems in the implementation of the general contracting project of rail transit project?   |   |
| Core interview      | Core type problem (what should be determined in the supervision of the general contracting project of rail transit project) | 3. Does rail transit project general contract project supervise current situation?<br>4. What does rail transit project general contract project need to supervise content to have? | The purpose is to discuss and analyze the regulatory content.   |
| In-depth interviews | Extension problem (exploration on supervision mode of general contracting project of rail transit project)                  | 5. How to realize effective management to ensure the realization of the project goal?   | The purpose is to discuss and analyze the regulatory approach.  |

This study interviewed 38 people who participated in the general contracting project of the subway. The interviewees are as follows:

Organize the above data and query the interview content according to the actual situation of the respondent. On this basis, the interview records are compiled and the interview records are converted into text materials.

Sort out the above data, and inquire the interview content according to the actual situation of the interviewees. Based on this, the interview records were sorted out and the recordings were converted into text materials.

**Table 2.** Open coding category and interview excerpts.

| The key category         | The main categories                  | Category  | Excerpts from some interview statements  |
|--------------------------|--------------------------------------|---|--|
| Admittance regulation    | Regulation of qualification          | Qualifications  | [13-1-2] Under the general project contracting mode, the management of contractor qualification should be strengthened to ensure that the contractor has a strong comprehensive strength to meet the requirements of the project.  |
|                          |                                      | The verification of the qualification                           | [6-1-2] The general contractor must be prequalified for the project.   |
|                          | The bidding regulation               | Standard series standard  | [7-3-6] In the process of bidding to ensure its open and fair, on the surrounding bid string bid behavior once found to be severely punished, to ensure the quality of project bidding.  |
|                          |                                      | Bid technical proposal  | [11-4-6] The technical proposal submitted by the general contractor during the bidding has a great impact on the later stage of the project. The owner should attach importance to the review of the technical proposal.   |
|                          |                                      | Tender offer  | [12-1-5] The general contractor has a profit-seeking nature. If the bid price is too low or even lower than the cost, the project performance will be affected. In the later stage, the general contractor may cut corners or propose a large number of changes to gain profits.   |
|                          |                                      | The bid opening scaling   | [16-2-5] The general contractor shall be determined in accordance with the provisions of laws and regulations and meet the requirements of the project.  |
| Construction regulation  | Assets supervision                   | Material maintenance  | [12-4-2] The storage and maintenance of materials in the implementation stage has a great impact on the quality of the project. The general contractor should prepare the storage and maintenance plan of materials and submit it to the owner for review. At the same time, a reasonable procurement schedule should be made to ensure the reasonable and orderly procurement of materials. |
|                          | Design supervision                   | Economics of program design                                     | [16-4-3] In the bidding of the project general contracting project after the feasibility study is completed, we should pay attention to the economic review of the project design to avoid the project assets becoming empty and damaging the national interests.  |
|                          |                                      | Rationality of construction drawing design                      | [13-4-6] Under the general contracting mode, it is necessary to strengthen the review of the design scheme, implement design optimization and pay attention to the rationality of the project cost.  |
| Quality regulation       | Material purchase supervision        | Procurement quality management                                  | [13-4-5] In the process of material procurement in the implementation stage, the general contractor may cut corners, which will seriously affect the quality of the project.   |
|                          | Construction quality supervision     | Construction organization design and construction plan          | [18-4-3] Construction organization design and construction plan have a significant impact on the implementation of the project, to ensure that the design and related technical requirements.  |
| Progress regulation      | Resources regulation                 | Project manager qualification                                   | [5-4-7] The project manager of the general contracting project should have similar project management experience to ensure the management ability and the overall control ability of the project.  |
|                          |                                      | The organization  | [3-4-6] Under the general contracting mode, a corresponding general contracting management organization should be established to comprehensively manage the general contracting projects.  |
|                          |                                      | Machinery and equipment   | [19-4-5] The quality of mechanical equipment has a great impact on the project objectives. During the implementation process, strict inspection should be carried out to avoid the   |
|                          | Time limit for a project supervision | Subcontractor selection   | [20-4-7] Under the general project contracting mode, it is necessary to distinguish what is changeable and unchangeable, and implement strict management on alteration and visa, so as to ensure the project cost and time limit.  |
| Regulatory regulation    | Investment regulation                | Change  | [23-4-6] The general contractor should make clear the condition of claim, and strictly check the change of the site, so as to prevent the general contractor from implementing implicit design change in pursuit of their own interests.   |
|                          |                                      | The claim   |  |
|                          |                                      | The visa  | [13-1-8] In the process of the implementation of the general contracting, the change, claim and on-site visa shall be strictly examined, and the evidence, reasons and timeliness of relevant matters shall be examined.   |
|                          |                                      | Completion inspection and acceptance                            | [24-3-2] After the completion of the project should pay attention to timely completion acceptance, completion acceptance procedures and materials should be complete and effective.  |
|                          |                                      | Completion and settlement                                       | [2-4-3] At the completion stage, it is very important to prepare completion settlement and final accounts. It is necessary to pay attention to the consistency between settlement price and work content agreed in the contract, so as to ensure the authenticity and completeness of  |
|                          | Payment regulation                   | Project payment   | [12-3-7] The general contracting project shall agree on the payment method of project payment in advance in the contract, and pay monthly or according to the image progress, so as to avoid disputes in the later stage.  |
| Environmental regulation | Energy-saving regulatory             | Environmental and energy saving evaluation                      | [20-4-7] Any project is probably to do environmental and energy saving evaluation, rail transit project is not to do environmental evaluation and energy saving evaluation.  |
|                          | Safety and environmental regulation  | Occupational health and safety and environment (HSE) management | [15-4-2] Occupational health and safety and environment (HSE) management is very important for any project. For general contracting projects, supervision in this aspect should be strengthened, project management units should be entrusted, and management system and emergency plan should be formulated.  |

### **3. Category refinement and model building**

There are two main stages of grounded theory coding: one is the initial stage, which includes naming every word, sentence or fragment of data; The second is the focus and selection stage. The most important or most frequent initial codes are used to classify, integrate and organize most data, and the steps of open coding, spindle coding and selective coding are carried out successively.

#### *3.1. Open coding*

Interview statement excerpts and initial analysis were conducted in the order of "interviewee no. -- interview question no. -- statement no." (for example, the code [12-4-6] indicates the sixth sentence of the content answered by the interviewee no. 12 to the fourth question). In the iterative process of coding, relevant codes are analyzed, and after several rounds of sorting out and extracting open coding contents, the final open coding category is formed through conceptual membership test and analysis, as shown in table 2.

#### *3.2. Spindle coding*

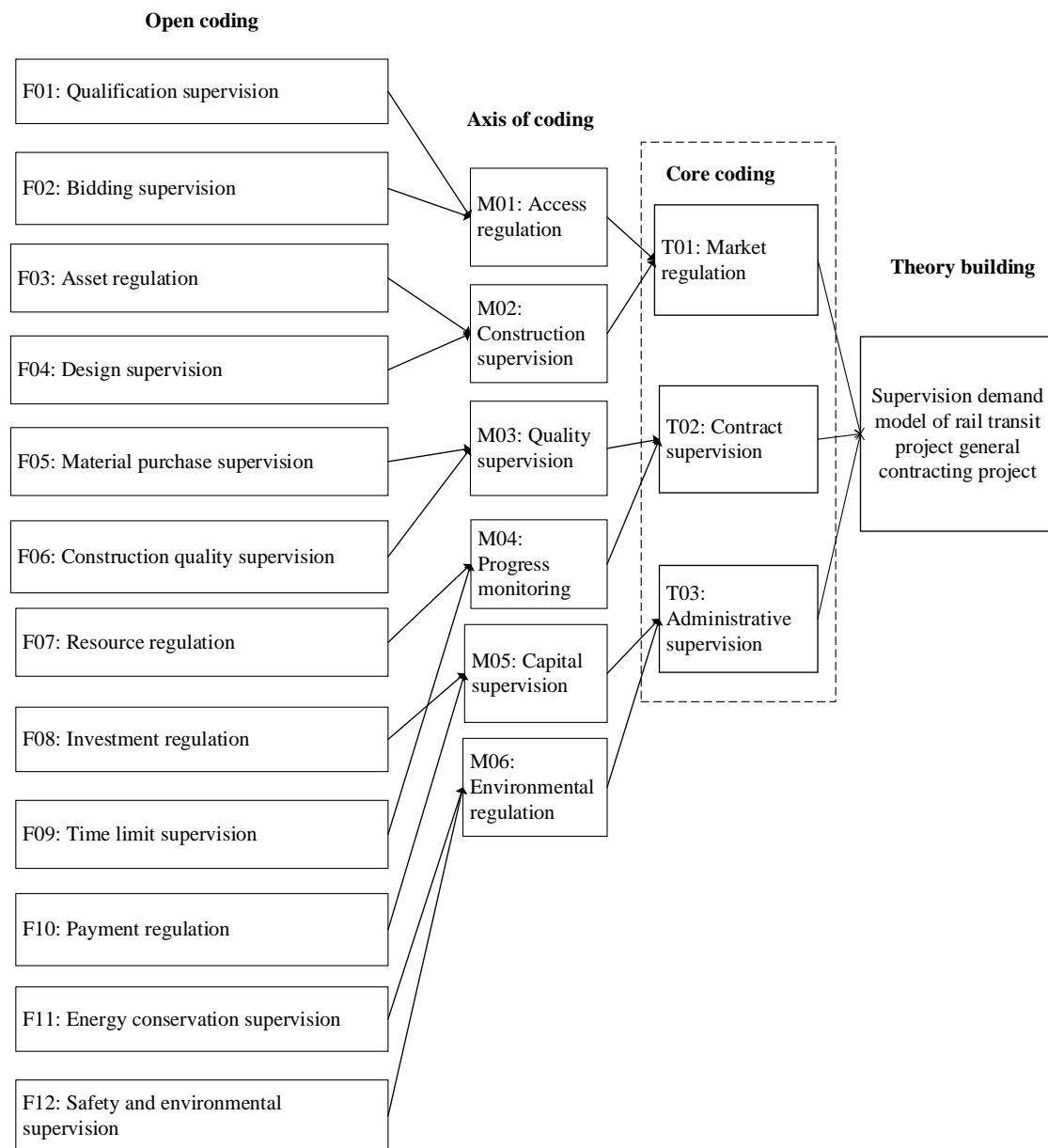
Interview according to the semantic relationship, project phases, and regulatory content, to analyze the above 23 categories and iteration and get the corresponding category under 12 axial coding, through comprehensive analysis of qualitative material, excavate the potential of the 12 concepts, eventually reveal some logical order and working substance, the logical sequence and classifies the business essence and form six core regulation, as shown in table 2.

#### *3.3. Selective coding*

On the basis of the six relationship categories, through the analysis of the mutual influence and causal relationship among them, we can clearly understand the content and requirements of the supervision of the general contracting project, and finally get three core categories: market supervision, contract supervision and administrative supervision. The core categories of these three aspects are also verified by existing relevant studies.

#### *3.4. Saturation test*

According to the saturation test of grounded theory, no new important category or relationship is found in the key content of the supervision of the general contracting project of rail transit engineering in the model. Therefore, this model has certain credibility and rationality and basically achieves theoretical saturation. Thus, the identification of regulatory content requirements of general contracting projects based on grounded theory is completed, and the regulatory content requirements model is further constructed, as shown in figure 1.



**Figure 1.** Rail transit project general contracting project supervision content demand model

#### 4. Analyzed and discussed

Regulatory requirements for the better will be implemented and promote rail transit engineering general contracting project performance improvement, according to the above identify regulatory requirements model of the track traffic engineering supervision requirements, but how to implement it in government regulation of the specific operation and advance the process, will be regulated business implementation as well as the key of effective regulation and fall to the ground. Therefore, combined with the characteristics of rail transit engineering, this study divides the government's supervision on the general contracting projects of rail transit engineering into market supervision, contract supervision and administrative supervision .

#### *4.1. Market supervision and analysis of general contracting project of rail transit project.*

The government should strengthen the supervision of access and construction to improve the management performance, improve the market supervision of the general contracting project of rail transit project, create a benign competitive environment for general contractors, and accelerate the market-oriented construction of general contracting.

##### *(1) Admittance regulation*

The government shall, in strict accordance with the requirements of laws, regulations and standards, establish an open, transparent and strict restriction on the entry conditions of the parties involved in the general contracting project, and establish a comprehensive evaluation mechanism based on the contractor's company size, credit, capital capacity, self-qualification, management ability and social responsibility.

##### *(2) Construction supervision*

In the construction process of the general contracting project of rail transit project, the government supervision department should carry out the laws and regulations earnestly and enforce the law strictly. When illegal bidding or subcontracting occurs in the construction process, it is necessary to strengthen the crackdown, deal seriously with the violation of the norms of the rail transit construction industry, and ensure transparent supervision of bidding activities, review of design plans and project safety and quality. In the whole process of construction, government agencies fulfill their rights and obligations in the form of legal documents, and formulate corresponding laws and regulations based on the actual situation of the local area, so as to provide legal protection for the construction supervision of rail transit projects and provide a basis for the disposal of illegal ACTS.

#### *4.2. Supervision and analysis of the general contract of rail transit project.*

Contract is the link between the interests of both the owner and the general contractor, the basis for project execution, the highest criterion for determining claims and resolving future disputes, and the perfection of government contract supervision is conducive to the formation of a scientific system of project supervision, as well as the criterion for ensuring the quality of the project to meet the standards.

##### *(1) Quality supervision*

The quality supervision of the government is embodied in the whole information, whole process and all-round supervision of project construction. Government departments shall establish a quality assurance system in accordance with the provisions of the contract. Compliance with the quality assurance system shall not relieve the contractor of any of his duties and obligations under the contract. The employer has the right to review any aspect of the system.

##### *(2) Progress of the regulatory*

The government shall exercise reasonable control over contracts and shall not impose interference or abuse of power. In the process of tendering and bidding, the government supervision department shall strictly supervise the tendering and bidding units, strictly examine the qualifications of the tendering and bidding units, ensure the contractor's qualification level, and ensure that the bidding and bid evaluation process is legal and reasonable.

#### *4.3. Analysis on administrative supervision of general contracting project of rail transit project.*

The general contracting project of rail transit project has the characteristics of large investment and complex project, and the lack of government supervision will not only cause the management cost but also form the financial pressure, thus it can be seen that the government administrative supervision is particularly important.

##### *(1) Capital supervision*

The government adopts the centralized payment system of fiscal funds and the evaluation system of fiscal investment to supervise and control the effective use of fiscal funds. This kind of project can adopt the centralized payment system of capital, so as to realize the control of investment, and the centralized payment of capital can reduce the link of capital flow and avoid the precipitation of capital. Environmental regulation.

## (2) Environmental regulation

The government supervision department shall formulate production safety standards and production safety system, supervise and urge the contractor to formulate internal safety system, and the government shall regularly inspect the operation of rail transit according to the production safety system. And the government supervision department should formulate the contingency plan in anticipation to ensure the safety of the project operation.

## 5. Conclusion

This study provides a theoretical basis and method for the supervision of rail transit engineering general contracting projects and the healthy development of engineering codes. Through semi-structured interviews, the research method of grounded theory analyzes the regulatory requirements of rail transit engineering general contracting projects, and derives the regulatory demand model. The core content of supervision includes market supervision, contract supervision and administrative supervision. It can be seen that it provides reference for the supervision and settlement of the general contracting project of the current rail transit project, improves the efficiency of project supervision, and achieves orderly development of the project.

## References

- [1] Jide Sun, Jiawen Fu, Shuhong Liu. Study on the combination of engineering general contracting and whole process engineering consultation [J]. Construction economics, 2018, 39(12): 5-9.
- [2] Yilin Yin, Ling Yan. On the construction organization and implementation mode and supervision mode of government-invested projects [J]. China soft science, 2003(12): 12-17.
- [3] Wen Wu. Research on incentive and constraint mechanism of project general contracting model [D]. Xi'an: Xi'an university of construction science and technology, 2014.
- [4] Xiaolin Cong. Research on EPC principal-agent mechanism [D]. Harbin: Harbin Institute of Technology, 2011.
- [5] Yilin Yin, Zhichao Xu. Development and evolution of trust state in engineering project organization: an exploratory study under the management situation in China [J]. Journal of management engineering, 2017, 31(02): 74-83.
- [6] Liangzhao Kang. Research on the bidding supervision system of government-invested projects [D]. Beijing: Beijing jiaotong university, 2016.
- [7] Ling Yan, Liu Liu. Capability model construction of EPC general contractors based on grounded theory [J]. Construction economics, 2018, 39(08): 112-115.