



Case Study of the Grade A Construction Company on Operational Difficulties in Taiwan

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Abstract. The construction industry plays a crucial role in the national economic development. Despite the Taiwan government investment substantial in various infrastructure, the operational challenges faced by the construction industry still severe, especially for “Grade A” construction companies. The study encompasses five major dimensions: industry policies and regulations, human resources, financial management, cost of raw material, and subcontracting management systems. Qualitative research methods are employed, including in-depth interviews with experts from the industry, government, and professional technicians. The suggestions gathered from these interviews are further refined through focus group discussions. This study concludes with recommendations for government agencies, the national tax authority, design and supervision entities, construction companies, and specialized subcontractors within the construction industry.

Keywords: Grade A, Construction Company, Operational Difficulties

1 Introduction

In recent years, the construction industry has undergone significant changes, primarily due to the rapid development of high-tech industries, a booming real estate sector, and a surge in demand for personnel. These factors have resulted in a severe shortage of labour within the construction industry. Furthermore, government initiatives to address climate change, including extensive infrastructure projects related to flood control, disaster prevention, forestry, soil and water conservation, as well as economic development initiatives such as port expansion and the growth of green energy, have compounded the talent shortage issue. Material shortages have also driven up costs. These challenges pose new operational hurdles that the construction industry must confront.

Lin [1] identified problems faced by the Taiwanese construction industry in terms of legal regulations, financial environments, labour force utilization, succession planning, technological development, and overseas market expansion, and proposed relevant suggestions for future assistance in the development of the construction industry. Liu [2] identified challenges faced by the construction industry, including strict regulations on public construction, a shortage of professionals, high staff turnover rates at the grassroots level, the transformation brought about by building information (BIM) technology, and a lack of international market experience. After years of management, particularly the shortage of professional talent, aging template and steel

talents are in short supply, insufficient professional attitudes, and labor-intensive hydraulic machinery assembly, require significant labor. Addressing these labor shortages and planning for future management strategies and business strategies will entail substantial changes and challenges. The objectives of this research are as follows:

- (1) To analyse the current operational and management challenges facing the construction industry.
- (2) To interview experts regarding strategies to address operational challenges.
- (3) To provide recommendations to “Grade A” construction companies, government agencies, and related entities.

2. Literature Review

2.1 Categories and Definitions of the Construction Industry

According to Taiwan's "Construction Industry Management Regulations, CIMR [3]", the construction industry as used in these regulations refers to construction firms that undertake construction projects; the scope and categories of projects are determined by the Ministry of the Interior. Nevertheless, in the business items listed for the construction industry registration by the Ministry of the Interior, it includes machinery production, mining, and machinery operation.

While the terminology definitions in the Construction Industry Act clearly categorize construction firms into general contractors and specialized contractors, with general contractors aligning with the original “Grade A”, “Grade B” and “Grade C” categories in the CIMR, as shown in Table 1. As for specialized contractors, they correspond to the firms qualify conditions within the original scope of civil subcontracting work.

Table 1. Categories of the Company in Construction Industry

Grade	Qualify conditions
A	1. Capital of over 100 million NTD. 2. Hold a Grade B construction industry registration certificate for a minimum of two years and have completed cumulative projects worth over 200 million New Taiwan Dollars during the period of employing a full-time engineer. 3. Employ at least one full-time engineer.
B	1. Capital of over 15 million NTD. 2. Hold a Grade C construction industry registration certificate for a minimum of two years and have completed cumulative projects worth over 100 million New Taiwan Dollars during the period of employing a full-time engineer. 3. Employ at least one full-time engineer.
C	1. Capital of over 3 million NTD. 2. Employ at least one full-time engineer.

2.2 Impact of Government Industry Policies and Regulations

In recent years, due to the substantial construction demands and the shortage of labour and materials in the current construction environment, the rate of bid withdrawal has increased, presenting challenges that need to be addressed. The current bidding process,

primarily based on low-cost competition, is problematic as it doesn't account for lengthy design schedules and rapid changes in the social environment, failing to reflect market and social costs accurately, thus contributing to increased bid withdrawal rates. Moreover, challenges related to construction, supervision, and other aspects arise during construction projects. According to Chen [4], there are legal frameworks in place for professional construction management in Taiwan, many unclear issues have arisen between project owners and the government in the execution of major construction projects. These issues have genuinely caused challenges and obstacles for government agencies and construction project owners. He also pointed out, with the gradual increase in labour and building material costs, the construction industry faces significant challenges in financial management and operational control.

The shortage of young labourers in the domestic workforce, coupled with the inability of local employment service centres in various counties and cities to recruit a sufficient number of suitable workers, has resulted in a severe labour shortage in the construction industry. However, in an effort to protect local workers, the government has imposed restrictions on the entry of foreign labourers into the construction industry. This has led to construction companies experiencing significant delays in project progress due to labour shortages, particularly in government public works projects, which has become a major concern for the construction industry. Based on the above literature analysis, this study identifies the following issues in the construction industry related to government policies that need to be addressed and improved:

- (1) Although some government agencies have recently introduced more reasonable qualification-based bidding processes; however, the final selection still heavily relies on price. The government does not sufficiently require construction companies to demonstrate their capability to execute the contracted projects. This lack of scrutiny can result in delayed or incomplete projects, and in some cases, even the bankruptcy of construction companies, leading to losses for citizens in terms of life and property.
- (2) The government uses bid bonds as a means to assess the financial execution capability of construction companies during the bidding process. However, it does not consider the long-term financial capabilities of the contracting construction companies. Should the government consider using the financial records of construction companies as an alternative evaluation method?
- (3) The government currently requires qualifications and educational backgrounds for design and supervision personnel in contracting projects but does not mandate practical on-site management experience. This gap in requirements contributes to communication issues and hinders project progress.

2.3 The Impact of Human Resources on the Construction Industry's Operations

The development of management talent in the construction industry not only relies on academic education but also requires hands-on experience in real construction sites. However, the younger generation's enthusiasm for the construction industry is severely lacking due to the influence of the current technological environment. This has resulted in a talent gap within the construction industry.

Assaad and El-Adaway [5] emphasize that construction productivity is a crucial determinant of industry performance. They highlight the causal relationships between various dynamic labour force and workplace variables and overall construction industry productivity. Total construction productivity is an additional valuable factor that construction companies should consider when making informed and well-educated decisions related to the industry. Cai [6] observed that the construction industry faces challenges related to economic conditions, financial pressures, cost management, and labour shortages. To address these challenges, the industry often relies on imported labour, resulting in an aging demographic among construction workers. Lin [7] suggested that age is a primary factor influencing the working capabilities of construction professionals. Other factors such as lifestyle habits, work attitudes, familiarity with the work environment, and government policies also play a role.

These findings collectively underscore the critical importance of addressing labour shortages, attracting younger talent to the construction industry, and ensuring that the workforce is equipped with the necessary skills and experience. Government policies, industry initiatives, and educational programs may all play a role in resolving these challenges and sustaining the construction sector's growth and competitiveness. Based on the literature analysis, the study identifies the following unresolved issues in human resources within the construction industry:

- (1) There may be a need to establish qualifications and avenues for continuous education to enhance the professionalism and academic progress of construction business owners.
- (2) However, the current process for developing site managers is considered stringent and may not align with the actual requirements. Consideration should be given to allowing individuals with extensive site experience and tenure to participate in site manager qualification exams.
- (3) The construction industry faces a negative perception among the young generation workforce, discouraging them from pursuing careers in construction.
- (4) The government has new criteria that construction firms are eligible to hire foreign labour. However, these requirements are considered overly stringent, resulting in many construction firms not meeting the conditions and thus being unable to address their labour shortage issues.

2.4 The Impact of Financial Management on Construction Industry

Chen [8] emphasized the importance of discussing the survival environment of the construction industry and its cost control and financial management aspects. Analysing a construction company's financial situation involves studying its capital structure, turnover ratios, and return on investment using financial statements. Fan [9] discussed bid profit evaluation: During bidding, construction companies list profits based on internal regulations, typically ranging from 3% to 10% of the total project value. This percentage is determined by factors such as project scale, nature, location, risk, difficulty, and return on investment, winning rate, and undertaking determination.

This research aims to explore the challenges and issues encountered by small and medium-sized construction companies in refinancing. A comprehensive understanding will be achieved through interactions with financial institutions such as banks and small and medium-sized enterprise credit guarantee funds. Based on the literature analysis

above, this study identifies the following problems to be addressed and improved in the financial operation management of the construction industry: The government's management of financial funds for construction contracting and the construction industry typically involves performance guarantee deposits and retention of progress payment funds, ensuring the smooth progress of government projects and subsequent contracting activities. However, when construction industry stakeholders face financial difficulties and are unable to complete contracted projects, there lacks proper financial protection and consideration for their financial operations.

2.5 The Impact of Raw Material Costs on the Construction Industry

The issue of rising raw material costs is exacerbated by the fact that the construction industry is labor-intensive and encompasses a wide range of project types and material categories. Excessive material wastage and surplus materials contribute to increased construction costs. Among the direct project costs, raw material costs typically constitute a significant portion, accounting for approximately 55-60% of the total.

This study raises several research questions related to factors such as raw material costs:

- (1) Imported raw materials are susceptible to fluctuations due to factors like the exporting country's situation, international events, and exchange rate fluctuations. These variations can lead to instability in project schedules and costs. Although central authorities set price index increase and decrease standards, the execution of these standards is often challenging. To better control price fluctuations, should central authorities establish more detailed standards and require execution agencies to diligently implement monthly price index adjustments?
- (2) Stable Sourcing of Earth and Sand Materials: While Taiwan has sources of earth and sand materials, concerns related to soil and water conservation have made these sources less stable. Should there be regulations in place to ensure a more stable supply of earth and sand materials?

3. Research Methodology

This study through a review of literature, this paper summarizes the research framework and theme. Qualitative methodology is proposed to be employed for this thesis. The current challenges and difficulties faced by “Grade A” construction industry are dynamic and multifaceted. Each challenge involves intricate cause-and-effect relationships across various dimensions. The goal of this thesis is to identify solutions to these complex challenges, which cannot be adequately addressed through linear analysis often associated with quantitative methods. Qualitative research allows for a dynamic and exploratory approach to problem-solving. It enables a deeper understanding of the nuanced issues within the construction industry and provides flexibility in exploring diverse perspectives and contexts. Given the intricate nature of the challenges in the “Grade A” construction industry and the goal of finding practical solutions, qualitative research is deemed appropriate for this thesis. It allows for a holistic exploration of the multifaceted issues faced by the industry and the development of informed recommendations based on insights and experiences shared by stakeholders in the field.

3.1 Interview Outline Development

Considering the above, semi-structured in-depth interviews offer high flexibility and low restrictiveness. They provide a considerable degree of interview flexibility, allowing participants to express their genuine feelings in the given context. Through relaxed conversation and interaction, unexpected insights often emerge. Therefore, this thesis chooses semi-structured in-depth interviews to explore the inner world of senior executives from the case, industry, government, and professional technical sectors. Before conducting face-to-face interviews, an interview outline is prepared. During the actual interviews, the purpose of the interviews is explained, relevant questions are addressed, and participants from the case, industry, government, and professional technical sectors are ensured to fully understand all interview topics.

Table 2. Interview Outline

Industry Policies and Regulations
1. Should the government consider a construction company's prior experience in handling relevant professional projects and the working experience of their site supervisors (site managers).in related projects as one of the qualifications for bidding, in addition to the existing contracting qualification criteria? 2. Should the government require design and supervisory personnel involved in the bidding process to have practical experience in on-site management, in addition to the existing qualifications and educational requirements?
Human Resources
1. Should construction industry owners have self-assessment and professional qualifications? 2. Should site supervisors be qualified for the examination based on their years of experience on the construction site? 3. Should licenses be issued for construction industry professionals, including formwork, rebar, plumbing, and masonry workers, to enhance the industry's image and raise the compensation of technical professionals? 4. Due to the severe shortage of basic labor force, the government should increase the proportion of foreign basic labor force and relax qualification requirements. 5. How to solve or improve the high turnover rate of construction industry personnel?
Financial Management
1. Can government financial institutions require appropriate contracting loan limits from banking institutions, with contracting contracts as the basis for loans? Additionally, to protect banking institutions, loans can be disbursed based on the proportion of project progress. 2. Should performance guarantee and project retention be reduced based on the financial proof of the construction industry itself? 3. Should the government's tax authorities arrange relevant counseling for construction industry owners regarding taxation? Given the high business turnover, clear definitions and explanations are necessary for tax subjects and rates within the same legal framework.

Raw Material Costs
1. Should the central competent authority establish more detailed standards to ensure that executive agencies actually implement monthly adjustments to the price index, in order to stabilize the raw material costs of the construction industry? 2. While Taiwan has sources of soil and sand, due to soil and water conservation factors, should there be more stable practices for sourcing soil and sand?
Subcontracting Management
1. Can the current use of BIM engineering project construction progress coordination models in the construction industry fully address the issue of subcontracting integration? 2. While the current subcontracting of construction projects affects project quality, and although owners are aware and can use punitive measures or cease cooperation, a better solution should be developed, especially considering the shortage of labor and the lack of alternative manpower.

3.2 Interview Participants

To enhance the richness and diversity of interview data, six experts from the industry, government and industry associations will be selected as participants for semi-structured in-depth interviews. This selection aims to achieve a balanced representation across different perspectives, thus providing a comprehensive insight into the issues under examination. Table 3 show the affiliation of these six participants.

Table 3 Basic Data of the Participants

No.	Domain	Affiliation
1	A	Chairman of Sheng Guan Construction Co., Ltd.
2	A	Chairman of Chi Cheng Construction Co., Ltd.
3	B	Director of National Development Council, Land and Rural Development Division
4	B	Chief Engineer of Tainan City Government, Public Works Bureau
5	C	Chairman of Tainan City Civil Engineers Association
6	C	Chairman of Tainan City Architects Association

Note: A: Industry Leaders; B: Government Officers; C: Professional Technician of Association

3.3 Interview Procedure

This study employs qualitative research methods, specifically in-depth interviews and focus group interviews, sequentially to collect data and analysis. First, in-depth interviews can provide the chance where participates can express their opinions independently. Participates in focus group interviews may affected one

another since the authoritative opinions appear. Therefore, conflicting or inconsistent views or recommendations arise from the in-depth interviews, this study conducts focus group interviews. These focus group interviews involve simultaneous interactions and discussions among participants, aiming to extract effective perspectives on complex issues. For points of consensus, the discussions delve into more specific and detailed practices and recommendations. The following research results summary of in-depth interviews and focus group interviews, along with an explanation of how they were implemented in this study.

4 Research Results

The following are research results drawn to provide guidance for the development and management of the construction industry and companies:

4.1 Industry Policies and Regulations

Government policies for contracting in the construction industry should consider not only the qualification criteria but also the management qualifications and experience of construction companies' personnel, particularly their site supervisors. The qualifications of the individuals responsible for managing construction sites should be a criterion for bid evaluation. Furthermore, the total contract amount of a company and its project history should also be taken into account as qualification criteria. For large-scale projects, in addition to the experience of site supervisors and project managers, qualifications such as those of quality control managers, safety officers, and mechanical and electrical supervisors with relevant labour insurance records should be considered as qualification criteria.

In the selection of design and supervisory personnel for construction projects, qualifications and academic backgrounds are essential criteria. However, it is equally important to establish practical experience requirements based on the specific characteristics and scale of the project. This ensures that individuals with substantial on-site management experience are appointed as design and supervisory personnel. Appointing personnel without practical experience in these roles can lead to operational difficulties and negatively impact the quality and completion timeline of construction projects.

4.2 Human Resources

The qualifications and professionalism of construction industry owners themselves should be subject to assessment and continuing education requirements. Currently, there are no specific legal provisions for assessing the expertise of construction industry owners. Some interviewees suggested that this issue could be addressed by considering personal data protection laws. Construction company owners could be required to attend workshops or seminars on engineering and construction conducted by contracting authorities. Furthermore, construction industry owners can voluntarily participate in relevant courses organized by social organizations or educational institutions to enhance their expertise.

Practical Experience in construction site management should serve as a prerequisite for participating in construction site supervisor training. After completing the training, individuals can then be eligible to take the construction site supervisor examination. Only those who pass the examination should be allowed to exercise the responsibilities, duties, and rights of a construction site supervisor.

Professional technical certifications should be introduced for the construction industry, covering various fields such as form plate, rebar, plumbing, and masonry work. This can enhance the professional image of technical personnel in the industry and lead to improved compensation for these professionals.

4.3 Financial Management

The government and the banking industry have already established contract-based construction project loans for construction companies. The government's financial regulatory agencies should encourage banks to provide appropriate loan amounts based on contract agreements and should also consider disbursing funds according to the progress of the project.

In the current construction industry, the practice of requiring a 5% bid bond, followed by a 5% payment for performance bonds (for a total of 10%), and a 5% retention for payment certification reserves places substantial financial pressure on construction companies, affecting their operations and, consequently, the quality of their projects. Therefore, it is recommended to further reduce the percentages of the three reserve funds.

4.4 Raw Material Costs

Detailed standards for adjusting material prices based on monthly changes in the price index should be established by the central supervisory authority. This would require executing agencies to effectively implement adjustments in accordance with fluctuations in the price index, ensuring the stability of raw material costs for the construction industry. Currently, while the central supervisory authority has established standards for price adjustments, various executing agencies face challenges in implementing these adjustments due to issues related to their responsibilities and budgets. It is suggested that contracting authorities initially disburse the original project funds and subsequently reconcile the price adjustments for construction materials during project settlements. Alternatively, a central fund allocation mechanism and local government cooperation could be considered. Further discussion and coordination with accounting and auditing units would be necessary to establish a fund disbursement method that aligns with regulations and avoids impacting the rights and obligations of both parties.

The government could evaluate the establishment of earthwork and sand and gravel banks in various locations to facilitate mutual support and utilization of earthwork and sand and gravel sources. This approach would stabilize the supply of these materials, reduce wastage of resources, and minimize environmentally inappropriate development and damage.

4.5 Subcontracting Management System

The current adoption of BIM (Building Information modelling).in construction projects for construction progress coordination has the potential to address the integration challenges related to subcontracting. However, BIM systems can be costly, it is recommended that professional construction management services or large-scale public projects with budgets exceeding 200 million should consider adopting BIM systems, as this approach is more economically viable. Government public works projects should require the use of BIM building model is in bidding processes.

The issue of subcontracting in the construction industry, which impacts construction quality, is a complex problem. There should be a shift towards training and certifying versatile construction teams at the grassroots level. This involves constructing versatile teams capable of multiple tasks, improving construction quality, introducing foreign labour, training local foundational professional talents, enhancing construction technology through precast methods, modular material systems, and digital coordination of standard operating procedure work flows in construction management processes.

5. Conclusion

This research aimed to address the operational challenges faced by “Grade A” construction companies in the rapidly evolving technological and industrial environment. The study focused on five core dimensions: industry policies and regulations, human resources, financial management, raw material costs, and subcontracting management systems. Valuable insights and recommendations were gathered through interviews with experts and scholars from various sectors, including industry leaders, government officials, and technical specialists. Following in-depth interviews, a consensus was reached through focused group discussions. The conclusions are drawn to provide guidance for the development and management of the construction industry and companies.

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