



Original Research Article

Briefing in Singapore Quality Management System Based on China Construction (South Pacific) Dev Co Pte Ltd's Practice

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Abstract: According to deeply analysis of the construction engineering quality super vision system in Singapore, this paper summarizes the supervision experiencesbfrom three dimensions, namely process, methodsand measures, Furthermore, analyzes the enlight enment of the quality supervision system of Singapore'Sconstruction engineering to the quality supervision of China, including establishing a life-cycle construction quality supervision system, formulating aunified quality evaluation method, aswellasimproving theconstruction quality assurance measures.

Keywords: Construction Engineering; CONQUAS; Quality Supervision; Singapore

In recent years, the construction quality remains a common problem in the construction industry. Construction engineering quality problems face serious challenges and are in need of improvements. Tracing back to the source, the lack of quality supervision of construction projects in today's construction industry is the main factor affecting those problems. There is a general lack of corresponding incentive and reward and punishment mechanism in the construction market, and the efficiency of quality supervision is low. In comparison, Singapore's government is very strict with the quality assessment system in Singapore. Under such strict system, Singapore has formed a set of targeted and scientific quality management system with its own characteristics. Because of this, Singapore's quality management system is being used for reference and studied by many countries as early as the 1990s to learn from Singapore's experiences and improve the lack of quality monitoring in the construction industry. However, the main focus was on the introduction of quality management experience in the construction industry and the reference of construction quality evaluation methods. Unfortunately, the introduction and summary of the construction quality supervision system of the Singapore government was not very comprehensive, Furthermore, the Singapore government has reformed the quality monitoring and management system since, and the supervision departments of construction engineering quality have also undergone great changes and achieved considerable improvements over time.

The Singapore government imposes strict regulations in terms of quality monitoring and management. First of all, the national construction authority in Singapore is under the Ministry of National Development (MND), Building Construction Authority (BCA) is the department in charge of the formulation of construction project quality standards and the assessment of construction project quality, and is responsible for the supervision and management of construction project quality. The authority set up a complete engineering quality standard monitoring system and evaluation system that includes design, construction, inspection and other aspect. Through these rigorous processes as well as government department supervision to ensure projects to complete with efficiency. These efficient policies and measures can ensure the quality of construction and greatly reduce abortive works and reduce safety hazards.

Due the current Covid-19 pandemic, over 30 new Chinese employees who graduated in 2020 could not travel to Singapore to work for China Construction (South Pacific) Development Co. Pte. Ltd. The China based Singapore Company intended to conduct a sharing through webinar to let them understand the Singapore Construction Culture so when they come on board in due time, they will be able to adopt to the industry environment. For this reason, we believe that through this webinar, Singapore's construction engineering supervision system will be comprehensively updated and summarized, and will be able to provide reference and experience to the rest of the world.

In collaboration with Nanyang Technological University (NTU), China Construction (South Pacific) Dev Co Pte Ltd (CCDC) has initiated and successfully conducted a Webinar session on 15 September 2020. The main topic of the lecture was on the introduction to China Construction's Quality Management System, sharing work experience from the perspective of a main contractor and how it has helped the Company to be recognized as one of Singapore's top quality builder in the construction industry.

China Construction (South Pacific) Development Co Pte Ltd (CCDC) is a regional subsidiary of China State Construction Engineering Corp. Ltd. (CSCEC), a state-owned company, and it is the largest construction & investment conglomerate, which was successfully listed in Shanghai Stock Exchange. CSCEC was also recognised as the 1st of the TOP 250 Global Contractors by Engineering News-Record (ENR) in 2019 and 18th on the list of Fortune Global 500 in 2020.

Established 28 years ago in Singapore, as one of Singapore's leading builders, CCDC has succeeded in carving out a niche market with extraordinary results that include 17 institutional projects, 29,535 units of premium quality private homes and 43,618 HDB flats as well as hotels and commercial hubs. 1 in 25 people lives in a home built by CCDC.

CCDC has received 192 awards and accolades along the way, which demonstrated a high degree of acceptance and recognition by the industry and various circles of local society, including 14 HDB Construction Awards, 51 BCA Construction Excellence Awards, 31 Green Mark Awards, 6 BCA Quality Excellence Awards in consecutive 6 years. And it is ranking 4th quality contractor by BCA ranking in the website, CCDC overall CONQUAS score is much higher than the industry average.

The participants of the above Webinar include undergraduate and master students from NTU, as well as new employees from CCDC who graduated in 2019 and 2020. Mr. Zhang Ming Ji, Deputy Managing Director of CCDC, and Mr. Robert Tiong, Associate Professor of the School of Civil and Environmental Engineering of Nanyang Technological University, attended the seminar and gave their speeches. Mr. Goh Senior QA/QC Manager of CCDC's Corporate QA/QC Department, shared his experiences on the content and application of the 9th edition of CONQUAS system. The webinar was hosted by Mr. Sheng Yu Kun, the head of CCDC's Engineering Technology Department.

In his opening speech, Mr. Zhang said that the company is deeply involved in the Singapore built environment industry for the past 28 years. CCDC is the subsidiary of CSCEC in Singapore, established in 1992, that has succeeded in carving out a niche market with extraordinary results. He stressed that through setting up a good quality management system, the company is able to deliver a high quality construction and sustain a good branding reputation. Recently, CCDC has won 6 BCA Construction Excellence Awards for all its 6 nominated projects which is endorsed by the Singapore Authority for the recognition of the company construction quality effort. CCDC is said to be the biggest winner in the BCA Awards 2020. The key to the success is the company's emphasis on training and developing broad career path, and this attracts talents from universities in China and Singapore including Nanyang Technological University. He hoped that all attendees can appreciate the construction industry and learn through the Webinar.

Mr. Goh, Head of the Corporate QA/QC Department, has led his team to conduct a series of online training during the pandemic, the crisis has shifted its focus from physical site inspections to virtual meetings and trainings. He has clearly illustrated the importance of giving attention to quality at all times, as it is involved all throughout the construction process. In addition, he gave some examples of major quality mishaps that happened in Singapore such as the New World Hotel collapse that killed 33 people, newspaper stuffed within the walls of flats and ceiling concrete slab falling inside the toilet that narrowly missed a domestic worker. These tragedies have alarmed many construction workers, and we should avoid such mistakes in our projects.

It was highlighted in the CCDC webinar that the CCDC regularly liaise with the Building Construction Authority (BCA), which is the government agency under the Ministry of National Development. One of the main duties of the Department is to promote and ensure that BCA quality guidelines and updates are regularly informed to all project sites.

BCA was established on 1 April 1999 through the merger of the Construction Industry Development Board and the Building Control Division of the former Public Works Department. It ensures that buildings in Singapore are designed, constructed and maintained to high standards of safety through its building regulatory system.

CCDC also spearheads the quality strategy while ensuring that project teams abide by the guidelines set by BCA such as the CONQUAS (Construction Quality Assessment System) and Quality Mark (QM) scheme. Aside from that, changes in the quality regulations and latest edition of CONQUAS are explained regularly during project's implementation.

The Construction Quality Assessment System (CONQUAS), introduced in Singapore since 1989, serves as a national standard for assessing the quality of building projects. Nowadays, Malaysia, Singapore, Hong Kong, China, Australia, Hong Kong, South Africa, India and United Kingdom construction field have started to implement the CONQUAS assessment system in their construction project. The CONQUAS system is widely adopted in the international construction industry due to the CONQUAS system is widely recognized and accepted as the benchmarking tool for quality internationally. Now, CONQUAS is recognised as a registered trademark.

The main objective of CONQUAS is assessing the quality of construction works to ensure the quality of the project meets the quality standard. Besides, it also enables the assessment of quality to be carried out within reasonable cost and time systematically. Furthermore, the constructed works will be assessed by the CONQUAS regarding the workmanship standards quality and specifications

Moreover, CONQUAS is considered as an independent assessment. All of the CONQUAS assessment can be only assessed by the BCA Singapore officer, means only the officer of BCA Singapore can become the assessor. The CONQUAS are using the sampling system as their assessment system. Sampling system mean that only few samples will be randomly chosen by the assessor for inspection to represent the quality of whole project, not every unit will be assessed.

The BCA Quality Mark (QM) was launched on 1 July 2002 to encourage developers to consistently deliver quality homes, in-line with the rising expectations of Singaporeans for better workmanship.

Under the scheme, BCA will assess every unit of newly completed private residential projects. The QM certificate will be issued to individual apartment that achieve a score of at least 80 out of 100 points (a minimum CONQUAS score for internal finishes), without any major defect and water seepage in the toilets / bathrooms and windows. The QM certifies the condition of the apartment unit at the time of inspection.

The CONQUAS has gone through different editions to adjust the quality of workmanship based on unit owners' expectations. For instance, important changes such as the shift from CONQUAS 8th to 9th edition has transferred the focus to more concentration to architectural works to meet and satisfy end-users' ever-growing expectations. It is therefore essential to tightened up and have stringent implementation of quality system as house owners' expectation is getting higher over the years. Thus, CCDC need to retain the mindset of "quality is when the customer returns and the product does not."

Internal Audit System is an important part of the Quality engineering monitoring system in Singapore. This system randomly spot-checks at all times on any on-going projects. Another salient point stressed during the webinar was the CCDC's in-house quality assessment system which serves as the backbone of the audit check to ensure the in-process and completed works for both structural and architectural works met the required quality standard based on BCA quality guidelines and tolerances. The Process Quality Assessment System (PQAS) is a regular quality audit check designed by the government. It is based on a sampling approach that works in tandem with the project teams' 100% quality check with the client's RE / RTO inspection.

To further increase the quality system's effectiveness, quality data extracted from the monthly reports are translated into half yearly and annual reports to indicate each project team's quality performance, as well as its strengths and weaknesses. Furthermore, this reports also analyses the quality performance of subcontractors, which is one of the key drivers in maintaining the quality of each trade works on site. This has greatly improved the system efficiency, saved time, and killed two birds with one stone.

CCDC has cultivated the quality culture over the years. It was not an easy task but with persistence, CCDC has succeeded in planting the "Quality is not an act, it is a habit" mindset into action. This continuing quality journey has positively led the company's mindset towards quality as a main component in being a more competitive and well-rounded contractor in the construction industry. The responsibility attribution of each work is clearly defined, there is no multiple responsibilities. With all these in mind, CCDC has made each staff understands that quality is everyone's responsibility. Everyone should always be precise, efficient and professional.

As for the annual construction event, the BCA Awards, CCDC is also there every step of the way. Mr. Goh guides the relevant projects from the pre-selection and nomination, to the preparation of presentation slides, up to the actual presentation to the BCA panel of judges. With the advantage of good CONQUAS score and the positive company image, the company manages to secure the coveted awards. With numerous quality awards from the BCA such as Construction Excellence Award (CEA) and Quality Excellence Award (QEA), CCDC has established itself as a consistent winner in the annual BCA Awards. All these concerted efforts were not left unnoticed as the construction firm has so far achieved 192 total awards and accolades, of which 51 BCA awards, 14 HDB awards and 6 Quality Excellence awards in 6 consecutive years are all related to quality. As one of the companies featured on the BCA website, CCDC has been recognized as one of the top quality builders in Singapore

CCDC has reached new heights and brought the company's reputation as a quality contractor at par, if not better with its peers in the construction industry. Each project's quality mindset has drastically changed to follow BCA's mantra of "doing things right the first time." Towards the end of the webinar, Mr. Robert expressed his appreciation to CCDC for conducting the important event. He further added that through sharing quality management experience in the construction industry, student participants were able to gain valuable insights and opportunity to understand the actual process of construction. He hopes to maintain a constant and interactive relationship with CCDC and looks forward to more collaboration in the future such as using CCDC projects as a platform for its research and trial in robotics and automated quality inspection.

Forging ahead, CCDC will continue to look for different avenues, for examples the webinar sharing sessions, to actively provide ways and opportunities to work with various institution for local and overseas graduate to help in shaping Singapore to be a safe, high quality, sustainable and friendly built environment.

The webinar has brought Singapore's project quality inspection management system to the attention of the construction industry. In today's construction industry, sometimes there is too little quality supervision in the engineering construction, and the reward and punishment system is not perfect. Therefore, to perfect the construction engineering quality, assurance measures and rewards and punishment system must be implemented. Established marketing, informative presentations, regulation standardization, the building engineering, quality management, project tending, good quality branding, evaluation system, etc, are essential components in the effort to promote quality responsibility awareness, and to enhance the overall level of construction quality in the construction industry.

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