

The Development of Construction Codes and Standards in Vietnam

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1 INTRODUCTION

Vietnam is a developing country that covers 329,562 square kilometres in the South East Asia with a dense population of 84.4 million, estimated by July 2006 (CIA 2006). At present, the infrastructures of this country is still underdeveloped. With an annual GDP grow rate of around 8% in recent years and the even of becoming a member of WTO in November 2006, it is expected that the construction market in Vietnam will be promising in the next few decades.

After the country changed the economy system from subsidized to market economy and open up the door for foreign investment early in 1990s, the construction activities in Vietnam have been overwhelmed with the various sources of investment including ODA, FDI, government or private ones. This has created a significant impact on the development of Vietnamese construction standards system, which was founded on the standard system of the former Union of Soviet Socialist Republics (USSR). More standards have been introduced or revised in harmonization with international standards, and Vietnamese engineers have been more engaged with using international or overseas standards. On the contrary, overseas engineers who come to practice in the construction industry in Vietnam also need to learn about Vietnamese construction standards system because there are still mandatory codes and standards that apply to any construction project in Vietnam territory. The application of different standards systems has sometimes created trouble in engineering communication as there are differences in the local system and overseas ones. Therefore it would be an advantage for overseas civil engineers who wish to participate in construction activities in Vietnam to gain prior knowledge about the Vietnamese construction standards system, although it would be better if a common standards system is mutually adopted or adapted amongst Asian region.

The objective of this paper is to present an overview of Vietnamese construction standards system and related regulatory documents, and the methodology of standards development carried out by the Ministry of Construction. Some ideas about code harmonization in the Asia region are also presented.

2 OVERVIEW OF VIETNAMESE CONSTRUCTION STANDARDS SYSTEM

2.1 Construction standards

The first Vietnamese construction standard was introduced in 1961 under the name "QP 01.61: Temporary code for wind load calculation". During the period from 1961 to 1990 a number of construction standards were developed with the help from the USSR and naturally they were based on the USSR standards system. In the subsidized economy, the implementation of construction standards in this period based primarily on mandatory basis with the number of mandatory construction standards accounted for about 95% of the total construction standards (Nguyen *et al.* 2003).

From 1990 to date, a large volume of construction standards has been introduced or revised to adapt to the open economy of the country. Approximately one thousand construction standards currently in use have been published in this period, which account for about 75% of the total construction standards. Many standards introduced or revised in this period are based on advanced standards from ISO/IEC, BS, and the American standards systems. The implementation of construction standards has also been changed gradually from mandatory basis to voluntary basis to align with international practice.

At present, there are approximately 1300 construction standards at national and branch levels. They are prepared, approved and managed by different ministries. The Ministry of Science and Technology (MOST) is responsible for approval and management of standards for general applications and those in the field of productions and goods such as specifications for cements, tiles, reinforcement, etc. The Ministry of Construction (MoC) is responsible for preparing, approval and management of construction standards for general application in civil engineering, for example the standard for design of reinforced concrete structures, standard for design of steel structures, or standards for check and acceptance work of construction project. Construction standards issued by the MOST or MoC are national standards. In the fields of transportation and agricultural construction there are specialized standards developed by the Ministry of Transportation (MT) and the Ministry of Agriculture and Rural Development (MARD), respectively. These standards are branch standards and are used mainly for construction projects managed by the respective ministries such as roads, dams, bridges, etc. It should be noted that the department responsible for standardization work in the MOST is the Directorate for Standards and Quality (STAMEQ) whereas responsibility for standardization work in the MoC, MT, and MARD is assigned to Department of Science and Technology in each ministry.

The coding part of each national standard consists of three fields. The first field contains the letter code indicating the type of standard and also the ministry that issues it. Before 2001 the standards issued by the MoC were assigned with the code TCXD. However new or revised standards issued from 2001 to date were assigned with the code TCXDVN to emphasize that they are standards at national level. Standards issued by the MOST are assigned with the letter code TCVN. The second field contains the number in order of issue. The last number is the year in which the standard is approved. For the coding part of branch standards, it consists of four fields, the first field is the number code of the ministry that issues the standard, the second field is the letter code TCN that indicates the standard is a branch standard, the last two fields are similar to the last two fields of the national standards. Details of the structure of the current Vietnamese construction standards system are tabulated in Table 1. It should be noted that the year of issue may be fully written or only two last digits are written.

Table 1. Structure of the current Vietnamese building standards system

Level	Code	Field	Issued by	Example
National	TCVN	General specifications, Production standards (cements, tiles, reinforcement, etc.)	MOST	TCVN 3992:1985
	TCXD, TCXDVN	Other fields in civil engineering (design, construction, planning, etc.)	MoC	TCXD 239:1998, TCXDVN 356:2005
Branch	22 TCN	Specialized in Transportation construction	MT	22 TCN 45:79
	14 TCN	Specialized in Agriculture construction	MARD	14 TCN 63:2002

Apart from national standards and branch standards, however, there are also company standards that are developed by companies themselves. The letter code of such standards is TC. These standards are usually in the field of concrete pre-cast production, and used for quality control of products within the company that develop them. At present such standards are not well recognized nor widely accepted by the construction industry in Vietnam.

2.2 Building regulations

In the process of changing the application of construction standards from mandatory basis to voluntary basis in the 1990s, it was recognized that technical regulatory documents were needed to uniformly control construction activities. In 1996 the Ministry of Construction of Vietnam introduced the first volume of a three-volume Vietnamese Building Code (VBC). This volume covers

the general requirements in construction activities and requirements in the field of construction planning. One year later the last two volumes of VBC covering other aspects of construction activities were also introduced. In principle, this Building Code was based on performance based concept. It contains minimum technical requirements that must be achieved and provides guidance on possible means to achieve the requirements (deem-to-satisfy provisions) or refers to standards that can be used to meet the requirements. Compliance to this Building Code is compulsory to any construction activity in Vietnam territory regardless of the source of investment.

Although the VBC covers almost all aspects of construction activities, the content of this VBC is still too general in some fields that lead to difficulties in the implementation. Therefore, new specific codes have been issued for particular fields, which are:

- Vietnamese Plumbing Code, introduced in 1999;
- Building Code of Construction Accessibility for People with Disabilities, introduced in 2002;
- Energy Efficiency Building Code, introduced in 2005;

These specific codes are also mandatory. According to definitions in the ISO/IEC Guide 2 (2004), these codes and the VBC can be regarded as technical regulations. This type of technical regulations has existed only in construction industry in Vietnam up to date. It should be noted that the English term "code" does not indicate the specific type of these regulations, although in Vietnamese there is a specific term for this type, because it may refer to a technical regulation or to a standard.

3 THE STANDARD DEVELOPMENT PROCESS OF THE MINISTRY OF CONSTRUCTION

As stated earlier, the department responsible for the standardization work in the Ministry of Construction is the Department of Science and Technology (DST). At present, any research institutes, construction management organizations, enterprises or universities can make proposal and prepare codes and standards. However, in practice most of the construction codes and standards are prepared by three research institutes: Vietnam Institute for Building Science and Technology (IBST), Institute of Architectural Research, and Institute for Science and Technology of Building Materials. In this paper, an organization that prepares codes and standards is referred to as a standards developer.

Currently the development of a construction standard or code of the MoC follows nine steps as below:

- Step 1: Planning

Each standards developer studies the need for new standards to be developed or existing standards to be revised and makes an annual standard development program. This program is submitted to the DST for approval before any detailed proposal for building a certain standard is made. In some cases where there is an urgent need for standards concerning the safety, health or environment issues, the development of such standards may not necessarily go through this step. It should be noted that up to date the construction standards in particular and Vietnamese standards in general are not periodically revised. They can be revised if there is clear justification on the need to revise them only.

- Step 2: Proposal for developing or revising standards.

Once a standard program is approved, the standards developer prepares a proposal for each standard to be developed or revised. The proposal is usually initiated by a Work Group (WG) of the standards developer that will prepare the standard. This proposal must elaborate the significance, objectives, scope and methodology of developing the standard, the members of the WG to prepare it, and the cost and time to complete it. Before submitting the proposal to the DST, a review meeting for the proposal is organized at the standards developer with a witness from the DST. After the meeting, if the proposal is approved by the scientific and technical panel of the meeting then it will be submitted to the DST for consideration. Once it is approved by the DST, a contract for preparing the standard will be awarded to the standards developer by the MoC.

- Step 3: Development of the first draft.

After being awarded the contract, the WG whose members are specified in the contract shall prepare the first draft of the standard. At the end of this step, a seminar is usually held to introduce the first draft and to gather comments from industry.

- Step 4: Making the second draft.
After getting comments from the seminar, the first draft is amended or revised to become the second draft. Once completed, this draft is submitted to the scientific and technical committee of the standards developer for review.
- Step 5: Review of the second draft.
The scientific and technical committee of the standards developer sends the second draft to two or three reviewers for comments and then sets up a meeting for reviewing the second draft. There is at least one witness from the DST and one invited expert from an external organization attend the meeting.
- Step 6: Making the third draft.
After the review meeting, the second draft is corrected or amended to become the third draft. This draft is verified by the scientific and technical committee of the standards developer before being submitted to the DST for review.
- Step 7: Review of the third draft
This step is similar to Step 5 except that the review meeting is organized by DST and run by a scientific and technical panel at ministry level. This panel is set up by DST and it usually comprises of experts from various organizations, including those that would be affected by the standard such as consultant or construction companies.
- Step 8: Making the final draft
The final draft will be made after the review meeting at ministry level and resubmitted to the DST for approval.
- Step 9. Publication and dissemination of the standard
Once the final draft is approved, it will be issued by the MoC and notified in the Government Gazette. Usually the standard will become effective after 15 days from the day of notification. The standard will be printed and a soft copy is uploaded to the website of the MoC (<http://www.xaydung.gov.vn>). The electronic versions of standards or codes that have been issued by MoC since 2003 are available in the website for free download. Some codes and standards published by MoC before 2003 can also be found in the website. For complicated standards, seminars may be organized to introduce them after the standards have been published to help industry to understand the standards and also to receive feedback from the users.

The limitation of this procedure is that only few people are involved in the development of the standard. The public seminar at Step 3 is occasionally held; even it is held there are usually not many people attended due to the lack of information and other constrains. The reviewing process, either at organizational level or ministry level, receives comments from only few experts in the field that the standard concerns. Therefore this procedure does not undergo the full consensus process as requested by WTO. It is the fact that before the standard is published, most people from the industry who will be affected by the standard are unaware about the content of the standard. Once it is published, any feedback from industry application can only be considered in the revised version, which usually takes a couple of years from the previous version.

To overcome this limitation, from 2005 there has been an additional step in the procedure of preparing a standard of IBST. After Step 5, the second draft is amended and uploaded to the website of IBST for comments (<http://www.ibst.vn>). Anyone interested can download the draft and give feedback to the Center for Standardization in Construction of IBST during the time of preparing the third draft. The feedback, if any, will be sent to the WG that prepares the draft for consideration. Discussion may be held electronically by email or via telephone or fax and updated information can be made to the third draft before it is sent to DST in Step 6. This mechanism provides industry with an opportunity to influence the content of the standard before it is published. Although this new step of IBST has not been widely known among people in construction industry, it has received many good comments and encouragements. With the introduction of a new law on standards and technical regulations, it is expected that this mechanism must be included in the preparation procedure of any standard.

4 LAW ON STANDARDS AND TECHNICAL REGULATIONS

In June 2006 a new law on standards and technical regulations has been passed by the XIth National Assembly at ninth Session and it will be effective from the first of January 2007. There will be a significant change in the development and management of the Vietnamese standards system.

Under the new law, the Vietnamese standards system will consist of standards and technical regulations. There will be only two types of standards: national standards and company standards. The branch standards will be revised to become either national standards or company standards. All national standards will have the letter code TCVN whereas company standards will have the letter code TCCS. The technical regulations will also be divided into national technical regulations, which are assigned with the letter code QCVN, and provincial technical regulations, which are assigned with the letter code QCDP. The application of standards is based on voluntary basis whereas the technical regulations must be compulsorily applied.

The preparation of national standards will be carried out by National Standards Technical Committees (NSTCs) established from experts in existing standards developers, and the authority that approve and issue national standards will be the Ministry of Science and Technology only. The procedure for developing a national standard will follow four basic steps as follows:

- Step 1: Planning.
Organizations or individuals propose standards to be developed or revised to the MOST for consideration. Some standards, especially those subjected to periodical revision, do not necessarily go through this step but directly appointed by MOST.
- Step 2: Preparation
The MOST assigns an appropriate NSTC to prepare the draft of a standard. Once the draft is made, the NSTC should seek for comments from concerned organizations and individuals by appropriate methods including organizing seminars.
- Step 3: Amendment and correction of the draft
After receiving comments from concerned organizations and individuals, the NSTC makes necessary amendments and corrections to the draft and sends it to MOST for review.
- Step 4: Approval
The review process is carried out by the MOST. If it is accepted then it will be issued by the MOST.

The procedure for developing national technical regulations is basically the same as that for developing national standards, except that the preparation and issuance are carried out by appropriate ministries, not NSTC.

It should be noted that under this law, all standards will be periodically reviewed for the applicability every three years whereas the cycle for periodical review of technical regulations is five years.

5 REGULATIONS ON APPLICATION OF FOREIGN CONSTRUCTION STANDARDS IN VIETNAM

The last decade has witness a booming in infrastructure development in Vietnam. Several large-scale construction projects have been built such as My Thuan cable-stayed bridge, Bai Chay cable-stayed bridge, National highway No. 5, Nghi Son cement plant, etc. Together with the flow of international investment in various kinds and the need for advance technology in big projects, the construction activities in Vietnam has also been internationalized gradually with the participant of many international or foreign enterprises taking part in the activities. From the code application point of view, the application of international or overseas standards in construction activities in Vietnam is inevitable.

In 1999 the MoC issued the Circular No. 07/1999/TT-BXD guiding the application of foreign standards in construction activities in Vietnam, in which standards from nine countries/organizations including ISO, EURO, USA, UK, France, Germany, Russia, Japan, and Australia may be approved for use in Vietnam by ministries managing specialized construction works after passing the

reviewing process taken by relevant construction authorities of those ministries. They do not need to pass through Ministry of Construction for approval. For standards from other countries/organizations, they must be approved by Ministry of Construction before use and in the case-by-case basis only.

In recent years, the number of construction projects built with private or foreign investment has been increased significantly. This has created a demand for a better regulation on application of foreign construction standards. Along with the effort in regulatory reform in Vietnam aiming at removing unnecessary technical barriers to trade in various sectors, in 2005 the Minister of Construction issued decision No. 09/2005/QD-BXD promulgating a new regulation on application of foreign construction standard in construction activities in Vietnam. According to this regulation, the foreign construction standards may be applied to construction activities in Vietnam provided that they:

- are standards at national, regional or international level and are effective;
- meet the requirements set out in the current Vietnamese Building Code and other mandatory codes;
- comply with principles for application of foreign construction standards defined in Article 3 of the regulations;
- are considered for application and are decided for application by the Investor/Owner before basic/technical design dossiers are made.

The principles for application of foreign construction standards defined in Article 3 of the regulations are:

- To ensure that construction works and products be made and they:
 - a) are safe for human use, for the works and adjacent works;
 - b) meet Vietnam's regulations on ecological safety and environmental protection;
 - c) yield econo-technical efficiency.
- To ensure synchronism and feasibility in construction process, from designing, construction to acceptance of works, and in the work entirely.
- To compulsorily use input data related to Vietnam's particular conditions stipulated in mandatory construction standards in the following domains:
 - a) Natural and climatic conditions;
 - b) Geological and hydrological conditions;
 - c) Classification of seismic zones and seismic degrees.

In general all foreign construction standards may be applied in Vietnam if they meet certain requirements related to very basic local characteristics. The significant change in this regulation compared to the previous one is that it has handed over the decision of using foreign construction standard to the Investor/Owner instead of seeking approval from appropriate ministries. This is an important issue that promotes the use of foreign construction standards and facilitates foreign investors to do business in Vietnam. For construction projects funded by the State Budget, if there is a Vietnamese standard available, this standard must be applied. In special circumstances, foreign construction standards will be applied if they are approved by the Ministry of Construction or relevant ministries for projects under their respective authorities.

5 HARMONIZATION OF DESIGN CODES IN THE ASIA REGION

It is the fact that design codes from the US such as Uniform Building Code, International Building Code and from the UK and European countries such as BS 8110 and Eurocodes are well known among civil engineers in many countries in the world. The reasons for this are mainly because they are advance codes and that they are available in English language, which can be considered as the international language.

In Vietnam, design codes from the US and European countries have been increasingly used although the current design codes in Vietnam are still based on Russian codes. Due to language problem, other advance codes such as those from Japan and China are not well-known in Vietnam and thus are not welcomed. Nevertheless, they are still used in some construction projects in Vietnam.

As many design codes are being applied in Vietnam, local and foreign consultant engineers are forced to study different codes to adapt to the requirements from different construction projects. This

results in the waste of time and lack of in-depth knowledge and skill necessary for design work. Moreover, communication problems amongst engineers are an additional issue that sometimes creates unnecessary troubles to concerned parties. Therefore, harmonization of design codes is essential and Vietnamese professionals are eager to participate in any activity for this work. In 2001 the Asian Concrete Model Code was published in dual languages, Vietnamese and English, after 8 years of hard work by International Committee of Concrete Model Code for Asia (ICCMC) which also includes Vietnamese professionals as members. Although this model code has little impact on daily practice, it will serve as the foundation for other practical codes to be built.

In the globalization process, Vietnam must choose an advance design codes system to follow and the Eurocode system has been being chosen. In September 2006 the first Vietnamese code on seismic design based on Eurocode 8 was introduced and the development of the codes on design of concrete and steel structures based on Eurocode 2 and Eurocode 3 is being carried out. It is expected that other design codes in the Eurocode system will be subsequently adopted soon. Considering this situation in Vietnam, the following approaches for harmonization of design codes are proposed:

(1) Develop a new Asian design codes system that can be adopted by a group of Asian countries.

This approach would take long time to complete such codes and require significant efforts from engineers and leaders of countries that join this group.

(2) Develop ISO design codes.

There are many ISO standards that are already developed as basis for design of structures, for example ISO 9194, ISO 3010, ISO 11697 etc. However the existing ISO standards are still not sufficient for design work. More efforts are needed to develop a full system of design standards that can be adopted internationally.

(3) Adopt the Eurocodes system to be used amongst a group of Asian countries.

This approach is more feasible because many Asian countries are familiar with the BS standards system and are getting use with the Eurocodes.

(4) Adopt some advance design codes systems such as the Eurocodes, Japanese codes, Chinese codes to be used amongst a group of Asian countries.

Some advance design codes from Asian countries like Japan, China may be adopted, provided that they are properly translated into English to prevent language problem in application.

6 SUMMARY AND CONCLUSIONS

This paper presents an overview of Vietnamese construction standards system and related regulatory documents. The construction standards system was basically established based on USSR system but it has been changed gradually towards European standards. Besides the standards, there are four mandatory codes in construction that can be considered as technical regulations. The current methodology of standards development carried out by the Ministry of Construction and the change in the development and management of national standards requested by a new law in Vietnam were also presented. This paper also introduces the current regulations on application of foreign construction standards to construction activities in Vietnam.

From the application of national and overseas design standards in Vietnam, it has shown that harmonization of design codes, in the Asia region in particular and in the global scale in general, is essential. Some approaches for harmonization of design codes in the Asia region were proposed, namely: Develop a new Asian design codes system, develop ISO design codes, adopt the Eurocodes system, and adopt a list of design codes systems including those from Asian countries.

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