

Work Theme B: Structural engineering on modern steel construction

B3 International practice on engineering design and management

Project Title:

a) “Marketing Strategies for the Development of the Steel Industry in Hong Kong”

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Project Team Members: Prof. Joseph Mak; Dr. Jackie Yang; Mr. Eric Siu

Progress / Achievement:

1. Produced a research paper titled "Factors affecting the development of the steel construction market" (Pending submission to an academic journal);

2. Progress of data collection and semi-structured interviews

Target stakeholder	Date	Research activities	Status
Steel stockist A	14 Nov 2016	Interview	Completed
	10 Jan 2017	Data collection	Completed
Developer I	5 Jan 2017	Interview	Completed
Developer II	20 Jan 2017	Preliminary meeting	N.A.
Steel stockist B	7 Feb 2017	Data collection	Completed
Steel stockist C	9 Feb 2017	Interview	Completed
Steel stockist D	13 Feb 2017	Interview	Completed

3. Preliminary findings

3.1 Highlights of the research paper

- The study performs a systematic literature review to synthesize and classify the factors into driving forces and/or obstacles behind the market development of the steel construction industry. A three-step desktop search was conducted to select the research outputs relevant to the chosen topic, resulting in a total of 63 articles identified.
- Based on a content analysis, a classification framework for the influencing factors is established, which comprises five main categories, namely, external, institutional, industrial, project-related, and individual factors, in which their sub-categories for 27 drivers and 26 obstacles are further ascertained (Table 1). This framework not only facilitates a valuable platform for policy makers and advocates to deepen their understanding of how the market can be developed, but also is useful for researchers to undertake further investigations on this topic.
- Research trends and interests of these studies are also addressed. For instance, the U.K. is the leading country in publishing most of the papers on the market development studies. In addition to academics, steel institutions significantly contribute to this topic. However, the methodological issues employed by these studies, mainly by state-of-art-review, call for further depth empirical studies involving all stakeholders within the steel construction industry to ascertain the predominant regional-based barriers and drivers.

3.2 Unit price of structural steel materials

Figure 1 shows the unit price of typical structural steel materials when comparing with that of high tensile steel bar. It indicates that the unit price of structural steel is about 35%~80% higher than that of reinforcement bar.

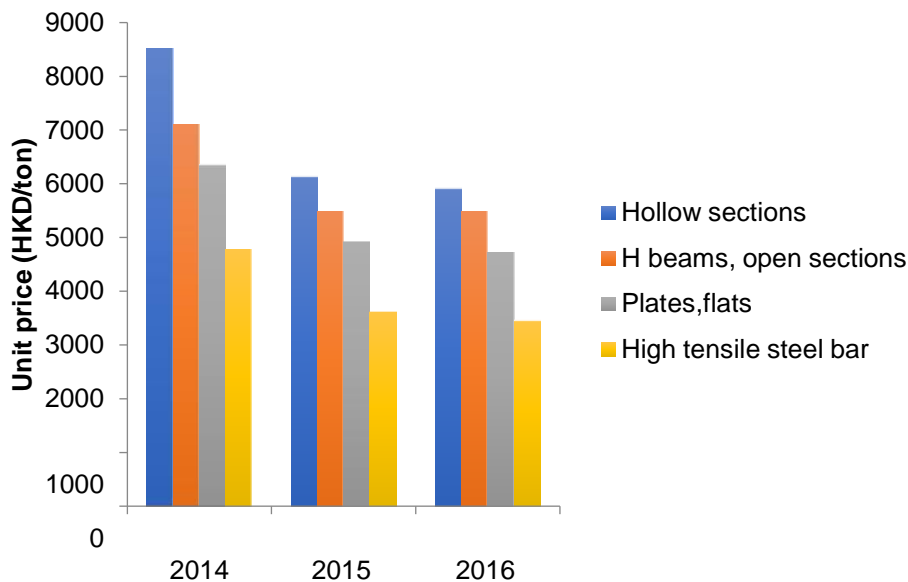


Figure 1 Unit price of typical structural steel materials and high tensile steel bar

Source: Unit price of the selected structural steel materials was obtained from two local steel stockists A and B, while price information of high tensile steel bar was collected from Average Wholesale Prices of Selected Building Materials published by the Census and Statistics Department. Other structural steel materials such as cold-formed hollow sections and galvanized steel sheets are not shown in this figure as only one stockist offers this information.

3.3 A Typical steel supply chain

Figure 2 illustrates a typical steel supply chain which is a common work practice from the perspectives of two local steel stockists A and C. The disadvantage of such a supply chain refers to additional transportation/logistic cost. Despite this, the local steel stockists still adopt such a supply chain in consideration of the following aspects: (1) in case the transportation cost can be reduced if Mainland steel can be directly delivered to the Mainland fabricators, it would incur value-added tax; (2) the role of steel stockist lies in the capability of delivering the available stock steel from Hong Kong's warehouse to Mainland's fabrication factories promptly.

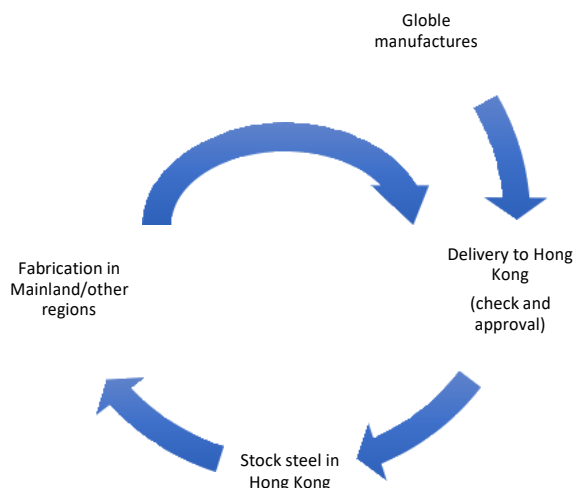


Figure 2 Steel supply chain

3.4 Major drivers and barriers to the adoption of structural steel from the perspectives of Client

Based on the interview with Developer I and a preliminary meeting with Developer II, a number of drivers and barriers can be summarized as follows.

Drivers:

- (a) the nature of the project (i.e., purpose-built, high-rise);
- (b) cost and time saving by using a steel structure as compared with an RC one according to the same architectural design;
- (c) the experience, capacity of, and collaboration between different stakeholders are essential to the management of steel delivery chain.

Barriers:

- (a) cost issues: (i) high economic burden in terms of labor and fabrication costs, and fluctuating steel price; (ii) lack of financial incentive regarding high land price;
- (b) time issues: (i) longer construction cycle (e.g., additional coating, approval test); (ii) inflexible for last minute change in case BD. disapproved the design; (iii) unapparent advantage in construction speed; (iv) long delivery time of steel materials;
- (c) lack of resources: (i) shortage of skilled labors and restriction on imported workers; (ii) site constraints; (iii) logistic issue regarding the delivery of large steel materials;
- (d) attitude and behaviour: (i) less familiar with structural steelwork / design codes than traditional RC design; (ii) perceived more risky by construction actors; (iii) conservative construction culture.

Table 1 Potential factors that influence the development of steel construction

Theme	Sub-category	Drivers and opportunities	Barriers and challenges
External	Economic climate	01. Economic boom	01. Economic recession / instability
	Social development	02. Urbanization	n.a.
		03. Natural events	
		04. Ageing structures	
Environmental liability	05. Sustainable development	n.a.	
Institutional	Political legislation and regulation	06. Supportive government policies	02. Strict policies
	Marketing	07. Effective marketing activities	03. Lack of marketing benefits / investments
	Institutions	08. Central organization	n.a.
		09. Trade association	n.a.
		10. Service center	n.a.
	Research and development	11. Research advances and dissemination	04. Lack of research and education
	Education and training	12. Implementation of education and training programs	
Industrial	Construction practice	13. Demonstration projects	05. Lack of demonstrated work practice
		14. Limitations of the tradition	
	Construction culture	15. Culture of continuous improvement	06. Conservative culture
	Technologies and techniques	16. Technology advances	07. Lagged technology
		17. Information techniques	
		18. Evolution of products	
	Supply chain	19. Integration of supply chain	08. Non-integrated supply chain
		20. Availability of steel products	09. Material-related issues
	Specifications, rules, and codes	21. Continuous development of design codes and standards	10. Incompatible guides and tools
Project-related	Resources	n.a.	11. Complex and rigid technical requirements
			12. Concerned quality

			13. Shortage of skilled labors and professionals
			14. Restriction on working space
	Cost, time, and quality	22. Recognized construction performance	15. Lack of financial incentives
		23. Long term benefits	16. High economic burden
			17. Perceived risks
	Information	24. Availability of databanks	18. Lack of data information
			19. Lack of technical information
Project management	25. Collaboration and partnering	20. Adverse procurement and contractual arrangements	
Individual	Attitude	26. Needs	21. Resistant to change from the tradition 22. Lack of interest and motivation 23. Perceived benefits of the tradition
	Behavior	27. Personal commitment	24. Unawareness of new technologies 25. Unawareness of long term benefits 26. Unfamiliarity of design codes and techniques