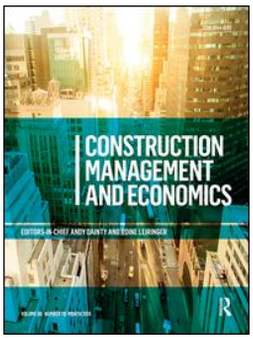

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Market structure of the construction industry in Hong Kong

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This study examines the market structure of four different sectors within the construction industry in Hong Kong. Market concentrations, expressed in terms of Herfindahl–Hershamann indices (HHIs) and number equivalents (HNEs), are calibrated for the top five contractors and compared with those of the local property industry. The study reveals the following ascending order of market concentrations: private building, public building, property development, and civil engineering. Our explanation is that technological and capital requirements have imposed a strong barrier to entry into the civil engineering sector, resulting in a concentrated market. Conversely, the lack of technological demand and supply in the private building sector has led to easy market entry and exit. Building contractors thus compete intensely on cost reduction rather than technology improvement, leading to poor construction safety and product quality. The paper concludes that the Government, being a major client of construction works and regulator of the industry, can assume a more active role in promoting the overall competitiveness of indigenous local contractors in Hong Kong.

Keywords: Construction, market structure, Herfindahl–Hershamann indices, Hong Kong

Introduction

This study examines the market structure of the construction industry in Hong Kong. Ever since the publication of the *Index of Economic Freedom* in 1995, Hong Kong has been ranked at the top of the scale (O'Driscoll *et al.*, 2001). This echoes the fact that Hong Kong has not placed any legal or institutional restrictions on the entry of foreign contractors. As a founding member of the World Trade Organization, Hong Kong has abided by the plurilateral Agreement of Government Procurement (Yue, 2000). Under the Agreement, members have to open the market to foreign contractors for construction services valued at 5 000 000 Special Drawing Rights or more (1 Special Drawing Rights = US$ 1.37 in 1997). Indeed, Hong Kong has been far more 'generous', because the minimum contract amount ($50 million) eligible for foreign contractors is much lower than this value. The openness of the construction industry has moved one step ahead since 19 June 1997 with the elimination of the demarcation between 'local' and 'overseas' contractors by the government. Irrespective of origins, all contractors are now included in one consolidated List of Approved Contractors for Public Works, provided that they have fulfilled three simple requirements on local business registration, technical competence of personnel and financial capability (Works Branch, 1997). Once admitted to the list, all contractors bidding for public works would be evaluated with the same set of rules, regulations and criteria. All these measures are in stark contrast with the relatively closed market and protected industrial conditions in other parts of Asia (Raftery *et al.*, 1998).

Although it now appears that the distinction between 'local' and 'foreign' contractors is legally superfluous in Hong Kong, it is not in substance. In this study, we distinguish between three types of contractor. First, 'local' contractors refer to the indigenous local contractors who first started their business locally. Second, 'foreign' contractors are those contractors that *were* previously included as the public List II contractors (eligible for contract value exceeding $30 million only). They are contractors who were once defined to be

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those 'whose main presence and head office is outside Hong Kong', as defined by The Rules for Administration of Approved Contractors for Public Works (*Government Gazette*, 1992). They were then admitted to the list because of their performance outside Hong Kong. Finally, 'localized foreign' contractors had their initial origins outside Hong Kong, but have since their first arrival established their main presence and local head offices in the territory.

Foreign contractors have long played an important role in building Hong Kong. Open bidding for public works has been adopted over the last century (Walker and Rowlinson, 1990). An Italian contractor was employed for the construction of tunnels for the Kowloon–Canton Railway as early as 1909 (Walker, 1995). Many of the local contractors, such as Leighton from Australia, Kumagai Gumi from Japan, Gammon from the UK and Dragages et Travaux Publique from France, are 'localized foreign' firms that have undertaken the Mass Transit Railway and many other civil engineering infrastructure projects. They are now joined by Mainland Chinese contractors, which have entered the local market since the late seventies. All these localized foreign contractors have established a firm base in Hong Kong and operated as separate business entities. They have built up their local expertise, while capitalizing on the resources and state-of-the-art technological support from their home bases. In short, they have the best of both worlds, operating in all sectors of the construction market (Rowlinson and Walker, 1995), expanding market shares and outperforming the smaller local contractors. Their success illustrates the important role of technology in creating and sustaining the competitive advantages of international contractors (Johnson, 1968; Tatum, 1986; Nam and Tatum, 1992; Raftery *et al.*, 1998).

According to *Hong Kong Contractor* (1986), foreign contractors captured a larger slice of civil engineering works than local contractors between 1983 and 1985. In terms of total building and civil engineering work value, the share of localized foreign contractors went up from 29% to 44% during the two-year period. In 1990, foreign contractors carried out about 25% of the total value of building and civil engineering work (Ganesan *et al.*, 1996). Between 1992 and 1994, in terms of contract value, localized foreign contractors had only 11% of the building market in public works contracts (Chan, 1996). However, they performed much better in the five civil engineering sectors, in which their market shares ranged between 31% and 75%. Chiang (1996) also reported that foreign contractors tended to dominate all the four categories of public civil engineering works. The competence of these contractors was again evidenced in the Hong Kong Airport Core Programme. By end-March 1996, out of a total awarded contract sum of HK$94.98 billion, local contractors, including localized foreign contractors, only secured 23% (by value). The remaining trunks went to Japan (capturing the largest share of 27%), UK (16%), China (7%), The Netherlands (6%), France (5%), and so on (HKACP, 1996).

What is at issue is the link between the market concentration of the construction industry and its institutional environment in Hong Kong. Economic theories suggest that the easiness of entry and exit to a market is a central determinant of the market structure and performance. An industrial sector that enables costless entry and exit of firms is described as a perfectly contestable industry (Baumol *et al.*, 1982). Stigler (1968) defines this long-run barrier as a cost that must be borne by a new market entrant that the existing firms do not have to incur. It is this kind of barrier that sustains the profits of the incumbents from falling to competitive levels. The seminal work of Bain (1956) identifies three major types of barrier to entry, including absolute cost advantage, economies of scale and product differentiation. A market with a stronger barrier to entry tends to be less competitive because it contains fewer players, and hence is more concentrated in structural form. A key consideration that deters the new firm from entering into a profitable market is the cost of exit (Carlton and Perloff, 1990). If the potential entry is associated with a substantial loss in sunk cost by the new entrant in fixed asset investment, this may hamper the contestability of the industry, which contains fewer firms (Oster, 1999). Thus, analysis of market structure is the very first step towards the study of market competition; it identifies the potential degree of rivalry within the industry.

Against this theoretical background, the present study sought to identify and explain the market concentrations of several work categories within the construction industry in Hong Kong. Our work has responded to Ofori (2000) by throwing some light on the relationship between globalization, industry development and the market structure of the construction industry in an open economy. This study addresses the important roles of governments in developing their construction industries. In many civil engineering sectors, such as bridge construction and tunnelling, the use of advanced and proprietary technologies creates market niches for the leading foreign contractors vis-à-vis the domestic players. This polarization of technological advantages is expected to enlarge as the less developed countries, for example China, have to open their construction industry to meet the WTO conditions. As Ofori (2000) reports, countries face the choice of developing their construction industries or using foreign firms on a long-term basis in complex projects. Indeed, the latter may be the only viable alter-

native for countries without large volumes of works. Moreover, joint ventures with foreign firms have proved in many instances not an effective vehicle for technology transfer. Their short-term objective of making profits clashes with a host country's long-term goal of industry development (Ofori, 1996).

Methodology

The market concentration of both the building and civil engineering sectors was measured by the Herfindahl–Hershamann index (HHI) as follows.

$$HHI = \sum_{i=1}^{n} (q_i)^2 \quad (1)$$

where n is the number of participants and q the market share. The HHI is the sum of the squared values of all construction firms' market shares in a particular sector. Since the market shares are measured from 0 to 1, the HHI has a positive value smaller than 1 in all cases except a monopoly, where the value is 1 (Hirschman, 1964; Scherer, 1980). The HHI has been used as a measure of concentration to assess a market's competitiveness (Stigler, 1968). In the USA, the Federal Trade Commission would rate an individual market as highly concentrated if its HHI exceeded about 0.18 (*The Economist*, 1997)

The Herfindahl-Hershamann number equivalent (HNE) is simply the reciprocal of the HHI. It indicates the concentration of a market with a number of hypothetical firms, which are assumed to have equal market share. However, the total market share of all such hypothetical firms would equal all the actual firms in the market.

$$HNE = \frac{1}{HHI} \quad (2)$$

In this study, the market shares of the top five firms in each of the construction sectors were taken in the computation of the HHI and HNE. Although not all firms are included, as Table 1 shows, there are distinct differences in the HHI, and hence the HNE, of the top five firms, which implies that there are clear differences in the market concentrations of the various construction sectors.

The building sector is classified into public and private subsectors. The civil engineering sector is confined to the public works only, as the amount of civil engineering works in the private sector is insignificant. The market shares of the top five contractors in each of the work categories were determined from tender reports. In the public sector, all contracts in public housing and in four civil engineering subsectors were covered for a 65-month period from 1992 to 1997(May). In the private building sector, all contracts undertaken by the local office of a major international quantity surveying consultant (hereinafter referred to as 'the consultant') were examined for a 48-month period from 1992 to 1995 and, as argued later under the Data section, serve as representing one-third of the total.

These findings from the construction industry were then compared with those in the property development market. The comparison is made because they are related industries, and because finance appears to be a key common factor in explaining market concentrations in both industries. According to the Hong Kong Consumer Council's (1996) study, the local property development market was highly concentrated.[1] Only the large developers with superior financial resources and access to capital at lower costs could remain active in the sector. Between 1991 and 1994, 61% of all new residential property was supplied by the top five developers. The HHI of the top five property developers is 0.10, and hence the HNE is 10. Despite the equal openness of the land market, all these five developers are local except for one Singaporean Chinese development company (Sino Land). This contrasts sharply with the situations in the construction industry, where major foreign contractors dominate the market. This study therefore used the property industry as the 'backdrop' against which the market concentration of the various construction work categories could be compared, and their performance and behaviour explained.

Data

All contract prices were converted to constant (first quarter of 1992) market prices in accordance with their corresponding tender price indices, including the Civil Engineering Works Index (CEWI) for the civil engineering sector, the tender price index (for Architectural Services Department building works) for the public building sector, and 'the consultant's' own tender price index for the private building sector.

Civil engineering sector

An analysis of the market share in the public sector is relatively simple, as the *Government Gazette* publishes tender results every Friday. Market shares of the top five civil engineering contractors were computed for each of the four categories: portwork, roads and drainage, site formation, and waterworks; for both large

and small contracts. Large (group C) contracts had contract values over $30 million in 1992–1994 and over $50 million in 1996–1997, while small (subgroup C) contracts were under $30 million in 1992–1994 and under $50 million in 1996–1997 (Works Branch, 1997).

Building sector: public

Based on gazetted information, the market shares of the top public building contractors were calculated. The same definitions of large and small contracts apply here as in the civil engineering sector. Similarly, market shares of the top five contractors in each of the specialist work and term contract categories in the public building sector also were derived.

Building sector: private

For the private building sector, the market share was calculated from tender reports prepared by 'the consultant'. It is one of the two largest quantity surveying consultant firms in Hong Kong. According to the other firm, they do not keep records of tender analyses. This set of data is therefore the most extensive information available for the analysis of the private building market structure. To ensure the representativeness of its entire records, we estimated the market share of 'the consultant' through the use of two parameters: (1) the contract values, and (2) the size of the firm. Both parameters turn out to indicate that 'the consultant' represented about one-third of the total private building sector.[2]

Data analysis and findings

Market size and concentration were computed for each of the work categories. Information for the major categories is shown in Table 1 and for the detailed categories in Appendix A. Our analysis shows that public and private building works altogether represent about 63% of the construction industry in terms of contract value.

Table 1 Market size and concentration in construction and property sectors

Work category	Sector size (%)[a]	HHI (Top 5)[b]	HNE (Top 5)[c]
Civil engineering	*22*		
Group C contracts in			
Roads and drainage	14	0.05	21.1
Site formation	4	0.26	3.8
Waterworks	2	0.25	4.0
Portwork	1	0.24	4.2
Subgroup C contracts in			
Roads and drainage	1	0.04	25.0
Site formation	–	0.06	16.7
Waterworks	–	0.07	14.3
Building	*63*		
Public Sector			
Group C contracts	16	0.05	20.0
Subgroup C contracts	1	0.02	50.0
Piling and foundation	1	0.07	14.3
Private sector			
Main contract	34	0.03	34.8
Building	5	0.17	6.0
Piling and foundation	5	0.04	24.3
Building services and specialist works	*14*		
Term contracts	*1*		
Residential property development	–	0.10	10.0

[a]Sector size: Value of contracts awarded in a particular work category as % of value of all contracts awarded per annum, where – denotes less than 1%. The values for the private sector are taken as 3 times the values undertaken by 'the consultant'. It has been estimated that 'the consultant' was commissioned for about one-third of the value of all private sector works during the 48-months period between 1992 and 1995. The values for the public sector were estimated from tender analyses of contracts awarded between 1992 and 1997 (up to and including May). Group C contracts had contract values over $30 million in 1992–1994 and over $50 million in 1996–1997, while subgroup C contracts under $30 million in 1992–1994 and under $50 million in 1996–1997 (Works Branch, 1997).

[b]HHI (Top 5): The Herfindahl–Hershamann index for the top 5 contractors under their respective work categories.

[c]HNE (Top 5): The Herfindahl–Hersharnann number equivalent for the top 5 contractors under their respective work categories.

Source: *Residential property development*, HKCC (1996).

Market concentration of civil engineering sector

The market of group C (large) contracts is about 23 times that of subgroup C (small) contracts. Within the study period, altogether 188 large contracts were awarded to 126 contractors, with a total value of more than $95 billion. There is much more market concentration for large contracts in all but the 'roads and drainage' category. In 'site formation', 'waterworks' and 'portwork', the HHIs of the group C contractors were larger than those of the subgroup C contractors by a wide margin. However, in 'roads and drainage', the HHI of the group C contractors is 0.05. This is not much more than the 0.04 of the subgroup C contractors.

Market concentration of public building sector

Unlike the civil engineering sector that is dominated by the foreign or localized foreign contractors, the public building sector is the playing field of local contractors. Many established contractors in this sector

have become specialized in public housing and institutional buildings, while a small group of large contractors also has repeatedly won maintenance contracts over the years. There are far fewer contractors in the group C category than in groups B and A, due to the stringent requirements on resources, experience and ISO9000 certification.

In the public sector, there is less market concentration in building than civil engineering. Indeed 'subgroup C contracts' is the most competitive of all the sectors surveyed, with an HHI of 0.02. For 'group C contracts', the market is more competitive, with an HHI of 0.05. This is a large sector as, in terms of contract value, group C building projects altogether represent more than 94% of all public building works. The top three contractors had a combined market share of almost 39% of the total value of contracts awarded between 1992 and 1997, and the top five had 47%. The market was very much concentrated in 1995, when almost 60% of all contracts (in terms of value) were awarded to the top three contractors, including China State Construction Engineering Corporation, Shui On Building Contractors Ltd. and Yau Lee Construction Co. Ltd. The former is of China Mainland origin, whereas the latter two are indigenous local contractors.

There is a positive correlation between contract value and market concentration in the public sector. The Herfindahl–Hershamann indices in each of all the public work categories (as listed in Appendix A) were regressed upon the corresponding natural logarithms of average contract values. The latter were expressed as their natural logarithms to ensure a better fit and reduce the statistical bias caused by the large absolute contract values. In the public sector, the correlation coefficient between the dependent variable (the HHI) and the independent variable (the natural logarithm of average contract value) was 0.53. The R^2 implies that about 28% of the variability in the HHI can be explained by differences in the natural logarithms of average contract values. Thus, in the public sector, the market tends to get more concentrated as contract sizes get larger. As a contract gets larger, it becomes more complex in one or more of the organizational, managerial, financial and technological aspects. Increased project complexity may have caused higher market concentration.

Market concentration of private building sector

In the 'main contract' category, the HHI was 0.03. This is in between the 0.05 and 0.02 of the group C and subgroup C public building sectors, respectively. The HNE index indicates that the market could be seen as shared equally by at least 33 main building contractors. This market is therefore more competitive than group C public building, although slightly less so when compared with the subgroup C public building. The competition among piling and foundation contractors is also intensive, though not to the extent of the main building contractors. The HHI of 'piling and foundation' is 0.04. However, the market for 'building', with an HHI of 0.17, appears to be far less competitive than either of the other two work categories.

In the private sector we detected no correlation between the contract values and the degree of market concentration (Appendix A). The correlation coefficient and R^2 were 0.04 and 0.001 only. Unlike the public sector, therefore, contract size does not appear to contribute to market concentration in the private sector.

Market concentration of building services, specialist works and term contracts

The sector of building services, specialist works and term contracts is a relatively small one, representing only about 15% of the construction industry in terms of contract value. There are altogether 31 work categories. Most are small in terms of contract value, e.g. 23 out of the 31 categories have their sector sizes less than 1% of the construction industry.

In the public sector, there are eight work categories. The HHIs ranged between 0.05 and 0.15. The range is somewhere between 'building' and 'civil engineering'. The implication also is that the competition in this sector is generally less than in 'building', but more intense than in 'civil engineering'. For the 'term contracts', probably due to their larger contract values, the three HHIs were between 0.10 and 0.35. This indicates in general a market concentration higher than in building works, and on par with large civil engineering works in all but the 'roads and drainage' sector.

In the private sector, there are 20 work categories. Usually, contract sizes are small, though degrees of market concentration vary. The HHIs ranged between 0.04 and 0.32. Probably due to their specialist nature, 13 out of the 20 work categories had their HHIs greater than 0.1. The market for refurbishment work seems to be the least competitive; it had an HHI of 0.32 and the top contractor was getting a market share of 46%. Indeed, the top five refurbishment contractors altogether had a market share of 99%. Conversely, the supply of specialist plant and equipment, site investigation and site formation, fitting out and finishes, and demolition are all very competitive sectors.

Discussion

Our study confirms that the markets of group C public civil engineering contracts in site formation, waterworks and portwork are the most concentrated, surpassing

that of the local property development sector. These markets are more concentrated than group C roads and drainage works, and group C public building contracts, which in turn are more concentrated than private building construction. Private building construction is the second least concentrated market in the construction industry of Hong Kong. The least concentrated market is subgroup C public building, but that represents only about 1% of the industry in terms of contract volume.

The high concentration of the group C civil engineering market is attributed to its technical complexity and capital requirements. In this sector, international contractors normally have a stronger technical advantage in gaining a foothold in host countries. According to the Construction Industry Institute International Construction Task Force (CII, 1993), the US construction industry lost half of its international market share between 1971 and 1985 due to a weakening of its advantages in technology. Back in Hong Kong, only a few local contractors can compete with the technologically and financially superior foreign contractors (Walker, 1995).

In Hong Kong, a wide technological gap exists between the civil engineering and building sectors. In our interviews with the top three public housing contractors in October 2000, they all commented that new entrants could easily bring their public housing construction technologies up to date within one year. However, the technology gap between building and tunnelling/bridge construction is formidable. According to one contractor interviewed, the gap is at least 20 years. Thus, the foreign contractors, often armed with their own proprietary technologies, probably will continue to dominate the civil engineering sector in the future. To compete in this sector, indigenous local contractors have to leapfrog to a comparable level of technological competence and work experience. For instance, major Japanese contractors have been working on a global scale, securing works from around the world in moving up their learning curve (Raftery *et al.*, 1998). At the moment, local Hong Kong contractors could gain access to advanced technologies only through joint ventures or partnering arrangements. Many local contractors, including the larger ones such as Gammon, have established themselves as a fitting local partner for major foreign contractors (Walker, 1995).

The growing adoption of design and build contracts by the public sector would tend to favour the larger foreign contractors more, because they could capitalize on their technological advantages and managerial competence. They have more capacity than their smaller counterparts in absorbing the design costs of unsuccessful tenders. Finance is another major barrier to entry. It is always difficult for domestic contractors to raise enough finance to improve and develop their technology. For those fewer contractors who managed to get public listing in the stock market, their costs of finance are much higher than property developers (Chiang and Yue, 2001). Local property development companies have long succeeded in tapping overseas capital markets with their issue of convertible bonds (*AWSJ*, 1993), but this way of financing for the contractors is still unheard of.

On the other hand, in general, foreign contractors are less interested in the private building sector. Their low participation is for two reasons. First, the traditional building sector is labour intensive and does not require proprietary or advanced technology. Foreign contractors do not have a cost advantage over the smaller players, whose overhead structure is appropriate for smaller scale building works. Second, major developers in Hong Kong have their in-house or 'inner-circle' contractors. Local Chinese developers are large by international standards. According to *Business Week* (2000), out of the 10 property firms that made it to the list of 1000 largest firms in the world, three were from Hong Kong, occupying the first, third and fifth positions. Being large firms, they are both vertically and horizontally integrated. As Mintzberg (1979, 1981) argues, large firms like them tend to produce for themselves rather than outsource. Besides, being large has its bargaining advantages. They have maintained long term business relationships with their small groups of contractors and have retained almost exclusive service from them. Due to the high concentration of property development in Hong Kong (HKCC, 1996), it is obvious that these two groups of contractors would also acquire the major trunk of the private building works. This closely knitted network of business is characteristic of traditional Chinese management. Based upon nepotism or long term *guan-xi,* personal trust is far more treasured than open competitive bidding (Redding, 1990).

Ball *et al.* (2000) argued that construction firms have few means of earning economic rents, but among the few is the potential one of sales networks, a source of 'added value' (Kay, 1996) in an otherwise highly competitive market where overall cost leadership appears to be a more viable generic strategy than differentiation (Porter, 1980). This long term relationship benefits both the developers and the contractors. It saves the former time and cost to search for reliable contractors, and facilitates the latter's forward planning with some guarantee of workload. The developers' in-house quantity surveyors ensure that these contractors are not charging them excess profits. This trust, once built-up, is treasured by both parties. This partnering is further enhanced when the contractors were once developers' employees who left to set up their

own firms. Perhaps especially in Chinese business, no outside people could aspire to be promoted up to what Mintzberg (1981) calls the 'strategic apex'. They have to leave the firms to set up their own to become their own 'boss'. Major developers fully appreciate that their best employees have to go one day. Therefore, they are ready to treat them as what Redding calls 'extended family members', and entrust them with the construction works. Although no statistics are available, it is definitely not uncommon in the local building sector. What it implies is that if the developers continue to dominate the property market, the down-stream construction market would continue to be dominated by these 'inner-circle' contractors, due to this strategic alliance between developers and their 'extended family members'.

Thus, there exists only a tiny slice of the private market for the intense competition among the majority of general contractors who are neither the in-house or 'inner-circle' contractors of the dominant developers. These general contractors may get work from the major developers only under two rare circumstances. First, the developers' in-house teams are already fully committed and further works have to be outsourced. Second, in the case of joint ventures, the works have to involve an independent third party other than the developers' in-house teams. These small contractors, lacking in financial and technological resources, are 'stuck' to this highly competitive building sector. Competition is often based on cost cutting. This strategy perpetuates a downward spiral of fierce competition, resulting in lower profitability and persistently inferior building quality. Only an institutional change initiated by the government can bring about possible improvements.

Implications on corporate strategies and government's roles

Ofori (1993) noted that, in many developing countries, foreign-owned contractors dominate the sector of complex civil engineering projects. The case of Hong Kong confirms this general observation. On the other hand, Ball (1988) observed that the building sector over the world remains generally a domestic industry, and attributed this to the institutional structures for an explanation. There are two key institutional factors that enable international contractors to gain foothold in the host countries. First, their employment is supported by their own governments through loans or subsidies to the host countries, or by their home clients. Second, they have resources that local contractors do not have, such as technology, finance and management. Without these factors, international contractors would be greatly disadvantaged by the diversity across countries of the social framework. Thus, corporate and government policies are conducive to the formation of the two conditions.

In Hong Kong, the government has never helped the local contractors in securing contracts abroad through fiscal means. This is unlikely to happen in the future due to two major reasons. First, the government has not targeted construction as an 'export' industry. Second, the overseas market of local contractors, such as China Mainland and other South East Asian countries, comprises either existing or prospective WTO members. They must adopt open bidding for any of their public works with a price tag of 5 million Special Drawing Rights or above. Governments of home countries have to resort to a more tacit approach, even if they decide to help their contractors to expand abroad. What a government can do is therefore limited to the provision of an environment that is conducive to industry and corporate development in construction. It raises the question of how local contractors can be made competitive.

Based upon Porter's (1990) national diamond model and Dunning's (1981) eclectic paradigm, Male (1991) concludes that the government plays an instrumental role in promoting the competitiveness of the construction industry in international market. In a similar vein, Ofori (1993) and Ball (1988) described the initiatives taken by the Singapore and UK governments, respectively, to promote advanced construction technology. Both support the conclusions of Hillebrandt (1984) and Hillebrandt and Miekle (1985) and, most recently, Hong Kong's own Construction Industry Review Committee (CIRC, 2001) that the government, being a major client, can contribute towards construction resource planning, especially in case of large public projects. In sum, there are four initiatives that the government can take: (1) facilitating factor supply and in particular the supply of finance, (2) raising demand, (3) strategic alliance with industry, and (4) work load stabilization.

Facilitating supply of finance

Government assistance in finance and technology is instrumental in developing a strong domestic industry, and subsequently in promoting exports of construction services. For example, the role of subsidized finance facilitated by the Japanese government is key to the rise of its contractors (Raftery *et al.*, 1998). Japanese contractors have levered on their ability to provide finance to the host countries in securing major market shares in Asia (ENR, 1998). In the USA, Yates *et al.* (1991) attributed the loss by American contractors of international market share to the provision of subsidized

finance by other governments. In Singapore, Ofori (1993) described how various parties in construction industry team up in vain to compete in international construction market. The competition was formidable due to many large international contractors receiving financial support or subsidies from their governments. In Hong Kong, there are world-wide market potentials for the local construction industry to explore. Levering on the strengths of Hong Kong in the provision of financial and its related services, the local construction industry has strong potential to develop into an infrastructure service integrator for the China Mainland market and elsewhere (CIRC, 2001).

Raising demand

Being major clients in construction, governments could adopt contract strategies, provide incentive measures and encourage the use of advanced technology (Hillebrandt, 1984; Hillebrandt and Miekle, 1985; CIRC, 2001). For instance, the government initiated industrialization of construction in the UK (Ball, 1988). In Singapore, the Housing and Development Board has adopted industrialized building methods (Ofori, 1993). In Hong Kong, the Housing Authority has required industrialized building methods since the early 1990s. This requirement has systematically raised the technology level of all public housing builders. These public housing contractors have all set up their subsidiary prefabrication plants in China Mainland. By contrast, there is virtually no industrialization of building construction in the private sector, because of the lack of such institutional requirements.

Strategic alliances

On a national scale, government could initiate joint efforts with the clients and contractors to promote research and development, and innovations. Yates *et al.* (1991) suggested that the construction sector in the USA needs to consider forming strategic alliance with international partners and governments, and improve its technologies to regain its competitiveness. Indeed, the number of alliances among American, Asian and European firms in all industries has grown thirtyfold during the eighties alone (CII, 1993). Strategic alliances or partnering have been much advocated for the construction industry in particular. It is due to the expectation that contractors will take up more and more of the roles that have been assumed by the clients' in-house consultants. More integration of design and construction is expected to improve 'buildability' of design, and subsequently to renovate technology. Similarly, in Hong Kong, the Construction Industry Review Committee (CIRC, 2001) has called for better collaboration between industry and local research bodies on construction-related research and development.

Workload stabilization

Governments can schedule public works to stabilize construction demands and to stimulate the general economy. Indeed the Financial Secretary of Hong Kong in his Budget Speech 1999 did intend to farm out more construction projects to stimulate economy. Fluctuations of construction demands have resulted in the widespread use of subcontracting and labour-intensive construction in the building industry (Ball, 1988; Low and Tan, 1996). A more stable environment can motivate the contractors to improve quality. However, if workload stability and quality standards are indeed closely interrelated, it implies that international contractors in complex projects could only grow more competitive. Their global operations have provided sufficient work capacity for them to perfect their technologies and to move up the learning curve. Over the passage of time, they have created large technology hurdles for other competitors.

Probably there is not much else that the government could do. Besides, there is a limit to what the government should do. For example, the government's initiatives may end up with the industry being too dependent on it: what Wong and Yeh (1985) called 'dependency mentality' or what Seligman and Hager. (1972) described as 'learned helplessness'. Too much government support, or featherbedding, could result in the industry learning to be helpless. Indeed Ofori (1993) comments that the construction industry in Singapore has 'tended to look upon the government for assistance in almost all instances . . . The enthusiasm of the industry for something to be done to ensure its well-being is seldom translated into action on its own part.'

Conclusions

Our findings on market concentrations suggest that the private building sector is the most competitive in Hong Kong. Unlike the public housing or civil engineering sectors, there is no dominant building contractor in this sector. These contractors resort to cost competition. Their construction methods are traditional and labour intensive. Most private buildings in Hong Kong are typically designed so as to optimize site coverage. Very often, labour-intensive construction methods are the least costly (CIDB, 1991). However, generally profit margins are razor thin, and are only squeezed through the exploitation of lower layer subcontractors. Competitiveness based on cost reduction is not sustainable, as it creates no enduring competitive edge.

Indigenous small local contractors flourish in this market, one that foreign contractors do not wish to enter, given their higher overhead costs.

Market concentration in the public building market is less than in the private sector, primarily because of technology demand. As the major client in this market, the Housing Authority has long required the use of prefabrication, standardization and modularization in public housing construction. Originally intended to improve concrete quality, such measures have incidentally worked to raise the technology of their contractors (Ganesan *et al.*, 1996). Barriers to entry were raised and contractors have since then competed on technology as well as on cost. For example, one of the top three contractors in this market, China State Construction Engineering Corporation, occupied the 34th position out of the 225 international contractors (*ENR*, 1997). They attributed their success during our interview to their consistent efforts in research and development in high-rise apartment construction. The other two leading public housing contractors we interviewed made similar remarks. The public housing sector demonstrates the pivotal role governments, as major clients and regulators, can play. If the government in Hong Kong were to adopt the recommendation of her Construction Industry Review Committee (CIRC, 2001) to promote further industrialization in building construction, then all contractors would have to be geared up to that requirement. The community could benefit from higher productivity and better quality buildings.

In the civil engineering sector, especially for complex tunnelling and bridge projects, contractors with foreign origins will continue to dominate. The technology gap would be just too wide for local indigenous contractors to close. Indigenous local contractors have called time and again for government assistance and intervention. However, the local government has stuck to the principle of positive non-intervention, and no assistance or protection measures have been offered to domestic contractors. However, as the domestic markets get saturated, contractors are pushed to explore overseas opportunities. Some of them have claimed that, with government help, their working experience in Malaysia and Vietnam can build up capacity at par with the Japanese (*BJHC*, 1995). At the moment, most of these construction activities result from local developers' overseas build-operate-transfer and joint venture contracts. For example, most of Gammon's work in Mainland China involves managing projects for clients in Hong Kong (*South China Morning Post*, 6 May, 1996). Another example is hotel construction. Many developers in Hong Kong, such as New World and Great Eagle, have been building hotels in China, Vietnam and other Southeast Asian countries. Naturally the construction work has gone to their construction subsidiaries. On a larger scale, Hopewell has initiated and constructed major infrastructure projects in China, Thailand and the Philippines. The trend of contractors' alliances with clients is likely to continue. Otherwise, it is unlikely that most local contractors could become competitive enough to compete in host countries if providing construction services only.

The imminent accession of China Mainland to the World Trade Organization is believed to further open up her construction market for Hong Kong contractors. China's investment of RMB38.7 billion in the development of the western regions in coming years will provide further opportunities to contractors worldwide. There is thus a pressing need for the construction industry of Hong Kong to better equip itself for the opportunities ahead. Lately, the Hong Kong government through the Works Bureau has been more actively involved than before in playing the role of a facilitator in promoting construction-related services in Mainland China. The economic significance of the construction industry was recognized by the Government in 1998 when the Government budget was drafted. Increased expenditures on construction were planned so as to bring in 'consequential benefits for individuals by providing employment in building work or by stimulating business activities that provide wider employment opportunities' (1998–1999 Budget). As Hong Kong strives to remain to be a free economy, it would be a major challenge for the local government to take the lead not to unfairly nurture the industry but to promote its productivity and competitiveness.

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Notes

1 Hong Kong has the largest and the most profitable property firm in the world, according to *Business Week* (2000) in terms of market capitalization. There were altogether 10 property firms listed in their 'Global 1000' in the year 2000. Three of them were from Hong Kong: Cheung Kong Holdings, Sun Hung Kai Properties and Henderson Land Development. They ranked 1st, 3rd and 5th, respectively in the 'real estate' industry group, or 251st, 364th and 727th, respectively, in the overall list. Their combined market value, US$42.364 billion at 31 May, 2000, was

about 8% of the topmost (General Electric's US$520.25 billion), or 44% of all ten property firms. In terms of profits, defined as latest after-tax earnings before extraordinary items available at 31 May, Cheung Kong Holdings' US$7.62 billion ranked 10th in the 'Global 1000', about 53% of the topmost (Hutchison Whampoa's US$14.25 billion). However, it should be noted that the size of the property sector is small. The ten property firms altogether had a combined market value only about 18% of General Electric, or 0.4% of the total. The construction sector is even smaller. There were only two firms in the 'construction and housing' industry group that made it to the 'Global 1000': one French (Bouygues) and the other Japanese (Sekishui House). Their combined market value was about 5% of General Electric, or 0.1% of the total. Despite Hong Kong's top ranking in economic freedom, there have been allegations that her economy has been built on cartels (*The Economist*, 2001). The Consumer Council concluded, after its six studies on various sectors, that Hong Kong needs a comprehensive competition policy and competition law (HKCC, 1997).

2 According to the Works Branch (1996), the total gross value of construction work performed by main contractors in the private sector between 1992 and 1995 totalled $133 029 million. During the same 4-year period, 'the consultant' undertook a total of 1128 contracts worth $63 174 million. According to 'the consultant', about 80% of this amount is in the private sector. That is about $50 539 million. However, this contract amount involves some double counting. The value of building services and other specialist works has been counted twice: once in subcontracts and again in main contracts. Tender analyses show that building services, specialists and minor building works altogether represent about 22% of the total. Consequently, the total main contract value amounts to 78% of $50 539 million, or $39 420 million. This is about 30% of $133 029 million. Thus, the market share of private building works for which the firms provided consultancy comes out to be around one-third. The size of firm provides another indication of the market share of 'the consultant'. The number of qualified quantity surveyors is used here as a surrogate for firm size. Based on the Hong Kong Institute of Surveyors' *Directory & Annual Report 1996/97*, the firm had about 30% of qualified members of the Institute employed in all the consultants listed. On the assumption that each member had the same productivity and undertook similar works, the private building market share of the firm was approximately 30%. From the two indicators, it is therefore estimated that the works commissioned to the consultant firm represented about 30%, or roughly one-third, of the total private building sector.

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Appendix A

Table A 1 Definitions of sector sizes, market share of top 1 to top 5 contractors, Herfindahl–Hershamann index (HHI) and number equivalent (HNE) for the top 5 contractors and average contract value in various public work categories 1992–1997(May), and in various categories of private works undertaken by 'the consultant', 1992–1995.

Work category	Sector size (%)[a]	Market share by top 1 to top 5 contractors (% of contract value in each work category)[b]					HHI (top 5)[c]	HNE (top 5)[d]	Average contract value[e]
		Top 1	Top 2	Top 3	Top 4	Top 5			
Civil engineering	*22*								
Group C contracts in									
Roads and drainage	14	21	24	28	31	34	0.05	21.1	20.19
Site formation	4	40	66	78	87	94	0.26	3.8	19.93
Waterworks	2	48	61	66	71	75	0.25	4.0	19.47
Portwork	1	45	57	67	74	81	0.24	4.2	20.14
Subgroup C contracts in									
Roads and drainage	1	14	22	29	35	40	0.04	25.0	16.91
Site formation	–	15	29	38	45	52	0.06	16.7	17.27
Waterworks	–	14	28	41	53	59	0.07	14.3	16.96
Building	*63*								
Public sector									
Group C contracts	16	15	28	39	44	47	0.05	20.0	19.56
Subgroup C contracts	1	8	15	21	26	31	0.02	50.0	16.85
Piling and foundation	1	17	30	42	51	58	0.07	14.3	17.52
Private sector									
Main contract	34	10	18	25	32	37	0.03	34.8	19.51
Building	5	36	49	60	67	73	0.17	6.0	18.61
Piling and foundation	5	12	23	32	40	41	0.04	24.3	17.62
Building services and specialist works	*14*								
Public sector									
Lift	–	20	37	54	67	76	0.12	8.3	16.46
Demolition	–	13	25	37	45	54	0.06	16.7	16.06
Fire	–	11	21	31	40	48	0.05	20.0	15.16
HVAC	–	16	27	37	46	47	0.06	16.7	15.85
Landscape	–	24	37	48	57	65	0.10	10.0	15.01
M & E Works	–	24	34	42	50	56	0.08	11.8	17.34
Repair and restoration	–	28	42	51	60	66	0.12	8.3	16.88
S/I[f] E & M equipment	–	33	46	56	66	73	0.15	6.7	17.30
Private sector									
HVAC	3	17	30	41	52	59	0.07	13.4	17.52
Lift	2	31	48	64	79	85	0.18	5.7	16.86
M & E works	2	28	41	52	62	66	0.12	8.4	17.01
Fire	1	18	35	46	55	62	0.09	11.6	16.08
Fitting out and finishes	1	15	29	38	45	52	0.06	16.7	16.59
S/I[f] curtain wall cladding	1	40	54	62	69	76	0.20	5.1	17.80
S/I[f] marble, granite and stone works	1	22	40	56	63	71	0.12	8.5	16.95
Alteration and addition work	–	20	38	50	62	70	0.11	9.3	16.45
Demolition	–	17	29	36	43	49	0.06	17.6	14.94
Fitting and fixture	–	46	66	73	79	84	0.26	3.8	15.97
Plumbing and drainage	–	16	33	48	63	73	0.11	9.1	16.74
Landscape	–	24	36	45	54	54	0.09	11.3	14.34
Lighting	–	28	52	70	84	96	0.20	4.9	15.77
Refurbishment work	–	46	70	92	97	99	0.32	3.1	17.30
Renovation work	–	22	39	52	63	71	0.11	8.9	15.58
Signage	–	25	44	60	75	85	0.16	6.4	14.34
Site investigation and site formation	–	13	26	35	36	44	0.05	20.7	15.69
S/I[f] kitchen and sanitary equipment	–	45	54	61	68	73	0.22	4.5	15.80
S/I[f] window and louvre	–	23	43	57	69	79	0.14	7.3	16.33
Supply of specialist plant and equipment	–	11	21	29	36	43	0.04	26.1	14.73
Term contracts	*1*								
Public sector									
Maintenance contracts	1	20	37	49	60	69	0.10	10.0	18.35
Design and build of fitting out works	–	52	70	85	100	n/a	0.35	2.9	18.93
Refurbishment of vacant flats	-	26	52	71	89	93	0.21	4.8	18.33

[a]Sector size:	Value of contracts awarded in a particular work category as % of value of all contracts awarded per annum. – denotes less than 1%. The values for the private sector are taken as three times the values undertaken by 'the consultant'. It has been estimated that the consultant was commissioned for about one-third of the value of all private sector works during the 48-months period.
[b]Market share:	Value of contracts awarded to the top 1, 2, 3, 4 or 5 contractors as % of value of all contracts under their respective work categories.
[c]HHI (top 5):	The Herfindahl–Hershamann index for the top 5 contractors under their respective work categories.
[d]HNE (top 5):	The Herfindahl–Hersharnann number equivalent for the top 5 contractors under their respective work categories.
[e]Average contract value:	Natural logarithms of average contract values under their respective work categories.
S/I [f]	Supply and installation of.