Propelling construction industry improvements through SMC development

M. Motiar Rahman, Mohan M. Kumaraswamy, S. Thomas Ng, Ekambaram Palaneeswaran & Onuegbu O. Ugwu
Centre for Infrastructure and Construction Industry Development, Department of Civil Engineering, The University of Hong Kong, Pokfulam, Hong Kong.

ABSTRACT: Recent construction industry development recommendations seem to have been mostly formulated from the perspectives of ‘large contractors’, e.g. in partnering. But small and medium sized contractors (SMCs) are very significant, in terms of their number and share in the industry, the workforce they employ, and the amount of work they carry out. Therefore, no improvement initiatives can be achieved without addressing the problems faced by SMCs. The present paper reports on an ongoing Research and Development (R&D) project in Hong Kong. It is designed to improve the efficiency of SMCs, which can eventually contribute to industry improvement. The paper conveys project highlights, including the types of services to be offered, in order to improve and maintain the SMC competitiveness. These are based on a preliminary ‘needs analysis’ study, a structured questionnaire survey, workflow analysis, and relevant feedback from the industry, including collaborating organisations.

1 INTRODUCTION

Industry Reports worldwide have long been recommending various measures for performance improvements in construction. While many of these recommendations are country-specific, there are common elements in the proposed improvement agendas in a few countries, such as the UK, Australia, Hong Kong and the Netherlands. The recent trend is to ensure value for money (VFM). For example, the Construction Industry Review Committee in Hong Kong recommends a ‘changed culture’ to ensure VFM (CIRC 2001). The Queensland Department of Main Roads in Australia urges to ensure VFM through effective procurement (QD 2003). The UK government advocates teamworking to ensure VFM (OGC 2003). More recently, in July 2004, recommendations have been made in the Netherlands to include trust and non-price based factors in the procurement to ensure VFM (PSIB 2004). The UK government advocates teamworking to ensure VFM (OGC 2003). More recently, in July 2004, recommendations have been made in the Netherlands to include trust and non-price based factors in the procurement to ensure VFM (PSIB 2004). Furthermore, integrated project teams and improvements in relationships have been recommended to ensure VFM.

However, the relevant literature suggests that the above measures are mainly focused on large contractors, as in partnering and alliancing with big clients, for example. The crucial role of Small and Medium sized Contractors (SMCs) in the project teams is frequently ignored. This is a serious oversight since no improvement initiatives can succeed without addressing SMC problems and propelling their own development. They carry out the largest share of the actual construction work in most countries - working as main contractors on smaller projects and subcontractors or suppliers on large projects. Also, they form the largest number of business organisations in the construction supply chain, create the highest number of job opportunities and employ a significant part of the younger workforce of most nations (Rahman et al. 2004b). SMCs often suffer from a lack of continuous work, face tough price competition, slim profit margins and delayed (if not denied) payments. They also suffer from inadequate sources of appropriate ‘information’, lack of time and resources for self-improvement and technological upgrading. Without sound Information and Knowledge Management (IKM) they can hardly improve their competitiveness and performance levels. Such a scenario clearly points to this often-overlooked barrier facing construction industry development initiatives.

In particular, it has been identified in the Hong Kong scenario that SMCs need to improve and maintain their competitiveness through sound IKM (Rahman et al. 2004a) that would enhance their current operating activities and future success (Rahman et al. 2003). Rahman et al. (2004b) portray how SMC competitiveness contributes significantly to VFM; while Ugwu et al. (2003) demonstrate how ‘easy to use’ and available IT tools can be successfully used in construction to increase VFM. Such approaches will primarily boost VFM in projects and
eventually also lead to efficient and integrated value networks through construction supply chains (Rahman et al. 2004b). Based on these approaches, Palaneeswaran et al. (2004) summarize and outline the possible solutions for SMC developments, targeting overall industry developments.

In the above context, this paper reports on an ongoing R&D project in Hong Kong that is designed to boost SMC developments through an SMC-friendly IKM framework and specific web-based tools.

2 THE SMILE-SMC R&D PROJECT

In order to meet specific needs of SMCs in Hong Kong, a research and development (R&D) project was launched in November 2003 at The University of Hong Kong. The project is captioned: ‘Strategic Management with Information Leveraged Excellence’ for Small and Medium Contractors (SMILE-SMC). The aim of the project is to empower the continuous improvement of SMCs by providing an SMC-friendly IKM framework and innovative tools for continuous improvement in boosting productivity, quality and image, through strategic information and knowledge management. For example, savings are envisaged through reduced wastage (of resources) and less rework (in rectifying substandard or defective works). The objectives of the SMILE-SMC project are:

To identify, consolidate, and develop good practices, critical success factors and appropriate benchmarks for SMCs

To develop a comprehensive framework and innovative tools for enhancing SMC competitiveness through structured modelling, knowledge capture, information management, collaborative team working and benchmarking mechanisms

To develop a SMC-friendly web-based ‘strategic information and knowledge manager’ to empower improved productivity, quality, safety and other critical performance aspects

To implement (on a ‘pilot run’ basis in at least three SMCs), test and refine the above framework and tools.

The above objectives are targeted using ‘easy to use’ and available IT tools and through a ‘one-stop’ information source. The planned deliverables of the SMILE-SMC project are:

A web-based information library for boosting SMCs’ business and operations. This will include information on new technologies, business opportunities and innovative approaches for SMCs.

A collaborative information and knowledge management framework that captures (and makes easily available) relevant SMC strategic information and business process knowledge.

A ‘strategic information and knowledge manager’, which will be an ‘SMC-friendly’ affordable business and operations support-cum-advisory system for SMCs.

Templates and initial issues of periodical (e.g. quarterly) newsletters/ e-bulletins on useful SMC matters

A basic training and hitherto scattered workshop package and a self-learning package to enable quick and effective usage of the above deliverables.

Clearly, the above requires the collection, distillation and translation of huge, diverse packets of information: multi-project, multi-organisational, and organisation-specific data for and from SMCs – with sources varying from those needed for their day-to-day business activities to strategic decision-making. Therefore, close collaboration and active participation from a motivated set of ‘pioneering’ SMCs or ‘Partner Contractors’ (PCs) was felt essential. Therefore, 15 such PCs were enlisted (targeting that some 6-8 may be available at any given time) through personal contacts and with the help of different collaborating organisations, such as Construction Industry Training Authority, Hong Kong Construction Association, General Building Contractors Association, and Hong Kong Construction Subcontractors Association. The PCs supply required data, assist in collecting data from their trade/ sub- partners/ contractors, attend monthly full team meetings, and provide feedback and suggestions in developing the SMILE-SMC system, and will participate in its validation and dissemination.

3 PILOT NEEDS ANALYSIS

Targeting the above deliverables, a pilot ‘needs analysis’ exercise was conducted through semi-structured interviews with 14 PCs. This allowed them to express their own problems, needs, ideas and suggestions. This provided a vast amount of information, indicating the importance of carefully analyzing authentic information. The exercise also identified priorities on various kind of information, barriers to obtaining those information, issues of their concerns that they would like to discuss on a common ‘platform’, automation/ enhancement of various work/ business processes they think helpful for improving SMC competitiveness, and the like. On the whole, the exercise confirmed the need for the type of planned for the SMILE-SMC, and as shown below: only nine types of information were included in the interview questionnaire, but the PCs mentioned almost three times as much. The diverse nature of the SMC needs is reflected in the two lists below.
A cross-section of types of information identified as very important or important

1 Information types listed in the questionnaire:
   New construction technologies. New information/communication technologies. Business opportunities in (a) Hong Kong, and (b) Mainland China. Critical success factors. ‘Performance Indicators’ – with (a) other companies, and (b) past and present projects. Best practices for benchmarking. Best practices in Health, Safety & Environmental issues (a) from Hong Kong, and (b) overseas. Best practices in Project Management from (a) from Hong Kong and (b) overseas. Case studies of successes/failures in SMC projects & SMC organisations.

2 Additional important information types identified by PCs: Indices for labour rate, prices and availability of materials, court cases for claims, rights and responsibilities for subcontractors, claims & insurances related to self-employed labourers/subcontractors, compensation claims on labourers’ wages/ injuries. Reasons of failure in SMC projects, SMILE to be a single source of ALL information, SMILE to be a forum to introduce oneself or product or service, Case studies of award winning projects on design and quality, Building regulations, Govt. Regulations on other issues, Contractors Code of Practice, Reflect market activities, Data of contract values (both public and private sector), Business conducted in previous year for companies, trades and whole industry (in order to identify a company’s market share), regular up-dates of information on SMILE-SMC website, advertisement of services or products on SMILE site, SMILE to make available information on sourcing and procurement, Message/ News from engineering and Architecture professions. More information, new products and new ideas can be provided on the website.

4 DISTILLATION OF INFORMATION

All the information and constructive suggestions collected from the ‘needs analysis’ exercise were discussed with the PCs and other collaborators and distilled. It was initially considered whether SMILE services could be potentially offered in five broad ‘zones’: ‘inter-organisational information exchange’, ‘discussion forum’, ‘intra-organisational information and knowledge flows’, ‘performance improvement’, and ‘benchmarking club’. Also, the overall strategy for SMC development was conceptualised as shown in Figure 1.

A pilot website was launched, feedback collected and improvements incorporated. A structured questionnaire survey was conducted to collect wider industry perceptions and prioritize a few ‘more’ important areas for SMC enhancement, from among an extracted cross-section of 30 items. All these items used in the survey were considered by the industry as important in general. However, some items were found more important than some others.

Figure 1. Conceptualisation for SMC development strategy

Detailed interviews for ‘workflow analysis’ (of common construction business/work process) were also conducted (in parallel with the above questionnaire survey), both with site staff and management of PCs. A full-day SMILE ‘Development Workshop’ was next held and provided more focused feedback on the above five potential SMILE service zones.

Some preferred and prioritised areas were identified, e.g.a need for SMILE to source and provide the latest ‘information’ on critical issues such as insurance and contractual/legal issues. Both the field workflow analysis and a survey conducted among the development workshop participants confirmed the importance of certain items, such as streamlining ‘Request For Information’ (RFI) and ‘confirming verbal instructions’, for SMC business process improvement.

Next, the first SMILE ‘Dissemination Workshop’ was organised to disseminate already collected, refined and translated information, with the basic structures of SMILE services. This allowed more focused and preferred areas of concerns and importance, leading to the present structure of SMILE-SMC and its relevant solutions. This is shown in Figures 2 & 3.

5 SMILE-SMC SERVICES

It has now been decided to offer the SMILE-SMC services in five broad ‘zones’ as shown in Figures 2 & 3: Wanted Zone, Available Zone, Information Li-
library, Discussion Forum and Performance Improvement. Other important features of the SMILE-SMC website include the ‘Member Zone’, ‘News and Events’, a section for ‘search’ and a section for ‘downloads’. These are briefly described below.

5.1 **Wanted Zone**

This zone is provided to facilitate a part of SMC business related activities. SMILE-SMC members can solicit any relevant services through this ‘zone’, e.g. in looking for a business partner, contractor, subcontractor or supplier; asking for any equipment, materials, people (such as engineer, quantity surveyor, carpenter, or plasterer) or other information (e.g. on contractual matters). Only the SMILE-SMC members will be entitled to post their messages here. Non-members would to be allowed to visit this zone and respond directly if appropriate.

5.2 **Available Zone**

Given that most SMCs frequently work in small-scale projects, their resource mobilisation is also relatively low. Yet, left-over/ unused materials are common phenomena in construction. SMCs cannot always dispose off such leftovers economically, leading to wastage. This ‘available zone’ is planned to provide SMILE-SMC members with a facility to post such messages and offer any other services, for example to be a subcontractor or supplier, wishing to buy unused materials or hire in/ out any equipment and any other available resources. Only the SMILE-SMC members would be entitled to post their messages in this zone offering any services. Non-members may also enjoy the services of this site – they may visit this zone and respond directly if appropriate.

5.3 **Information Library**

The information library is not planned to be restricted to any potential user. Anyone can search this zone for any available information. Information is being categorized under five broad grouping of ‘Statutory or Regulatory Information’, ‘Business Practices’, ‘Strategic Information’, ‘Useful Forms’ and ‘Other Information’. This zone is planned to eventually develop into a ‘one-stop’ source of information for SMCs. For example, this zone will provide a comprehensive listing of all “open” and “upcoming” tenders from all major government works departments, quasi-government organisations and major private clients.

Important and frequently used information is being consolidated and presented in ‘easy to understand’ and user friendly formats with flow charts and pointers wherever possible, for example ‘how to obtain a noise permit’. Examples are being provided in appropriate cases. In addition, various terms and examples are being hyperlinked both within the SMILE-SMC website and any other related or parent website. Such formats, examples and hyperlinks are being provided and identified with the close cooperation of the PCs – the actual users.

5.4 **Discussion Forum**

This zone is being developed in order to provide a platform for the SMCs to discuss their concerns and issues of common interests. Only the SMILE-SMC members are expected to enjoy this service. Members would be given two levels of access here: for day-to-day use and for managing/ updating their own user profiles. Each member can have up to five user accounts in his company. However, before ac-
cessing services, one needs to acknowledge the disclaimers and log in using the authorised user name.

5.5 Performance Improvement

Contents of this site are mostly for members. Services provided through this site include: generic formats/templates for improving day-to-day business activities, strategic management of critical information and knowledge, and benchmarking. Services under this zone are being developed in three modules: Electronic Information Exchange (EIE), Strategic Knowledge Management (SKM), and Benchmarking. Some of the services (e.g. templates) can be for company specific uses, for example management of sensitive/confidential information and knowledge that is a part of SKM. On the other hand, some other services would require members to disclose certain selected company specific information to chosen partners, for example in benchmarking.

As a part of the EIE, a plug-in is being developed that can be used by a group of people, for example in the project environment and by the contractor, subcontractor, supplier, consultant and client. An attempt is being made to provide a free platform authentication. Inter-organisational benchmarking is planned to be provided under the ‘benchmarking’ module of this zone, whereas the intra-organisational benchmarking is being positioned within the SKM module. However, some of the services (e.g. templates) will be common in both intra- and inter-organisational benchmarking.

5.6 Other services

The ‘Member Zone’ presents the application procedure to be SMILE-SMC member with an easy to understand flowchart and application form. SMILE-SMC members themselves could update their member profiles and user accounts. However, anyone can search for any member from this site.

The ‘News and Events’ section is planned to cover the industry news and events related to the SMCs. This will include, for example, news on any important training that is suitable for SMCs, and changes in the rules and regulations. A ‘search facility’ is being provided to search both within the SMILE-SMC website and access the Internet. Moreover, anyone will be able to download any relevant document/information from a selected cross-section of documents/information.

Some parts of the SMILE-SMC website are being developed in bilingual modes (i.e. English and Chinese), some critical parts are planned for translation into Chinese in order to meet the specific ‘local’ requirements, while some less critical parts are planned to be translated at a later stage, when needed. Meanwhile, it has been planned to facilitate access to the SMILE-SMC services through ‘training workshops’, apart from periodical newsletters and e-bulletins. In addition, a self-learning package/tool will be developed, to enable the SMILE-SMC users a quick and effective usage of the services.

6 SMILE-SMC USERS AND USES

The R&D project that is being reported in this paper focuses on SMCs in construction industry. This includes SMCs who work as main contractors on small and medium projects, as well as SMCs who work as subcontractors or suppliers on all types of construction projects. This also includes SMCs who carry out E&M and trade-specific works, for example, scaffolders. On the other hand, SMILE-SMC will provide useful services to large contractors (e.g. when looking for any specific business partner for a specific job). The strength of a ‘main contractor’ in fact depends on the quality of its subcontractors and suppliers (Kale and Arditi 2001). When circumstances warrant special care, clients will be able to search and precisely nominate a specific SMC for any specialised work. In return, ‘main contractors’ will be able to deliver better quality projects. This will in turn deliver value (i.e. VFM) to the clients.

However, targeting improvement of the whole construction industry in Hong Kong through such an R&D project may not be easy, especially when its primary focus is SMCs. Nevertheless, the project is being supported by the Construction Industry Training Authority that is well known for its role in industry development, Hong Kong Construction Association that mainly represents ‘large contractors’, General Building Contractors Association that mainly represents the ‘medium sized contractors’ and ‘upper’ segment of SMCs, and Hong Kong Construction Subcontractors Association that represents ‘small contractors’ and members of different trade associations. The Provisional Construction Industry Coordination Board, and Federation of Electrical and Mechanical Contractors are also supporting the project. Experts from five international bodies in Australia, Singapore and the UK are also advising the research team.

Furthermore, SMILE-SMC services are being developed based on the actual needs of this critical target group. It is therefore expected that the SMILE-SMC project will pave the road for SMCs in improving their competitiveness. This will gradually transmit to other industry groups, for example large contractors and clients, and thereby extend to the whole construction supply chain, leading to an effective and efficient construction industry.
SUMMARY AND WAY FORWARD

In the recent years, SMCs in Hong Kong are operating under conditions of cutthroat price competition, less work, new technologies and materials, and an increased number of new initiatives that are targeting a ‘changed culture’ of boosting VFM. Apart from the scarcity of their resources, SMCs cannot address these external issues by themselves, since those are externally based and need external adjustments and within the industry as a whole. Instead, construction organisations, especially the SMCs need to adjust and improve their internal strengths to adapt to a given external environment, in order to improve their competitiveness and survive, i.e. to maintain current operating activities, as well as to facilitate future success (Rahman et al. 2003). SMILE-SMC is an initiative to foster such SMC competitiveness.

SMILE-SMC services are being developed based on the actual needs and priorities of SMCs. The diverse and vast needs and priorities have been/ are being consolidated, distilled and translated from the feedback and collaboration with various industry representatives. Moreover, the proposed services, respective contents and relevant SMILE solutions are the outcomes of rigorous research, which is also complemented by the more focused opinions of the participants from the two workshops. It is therefore expected that the SMILE-SMC services will be useful for SMCs in Hong Kong.

The SMILE-SMC project is still ongoing. However, examples of benefits of its services include that: members will be able to (a) share their views and concerns on a common platform, and seek and provide suggestions on various issues (e.g. through the discussion forum); (b) easily identify ‘business opportunities’ (from information library) and potential business partners (through wanted and available zones); (c) save wastage (e.g. through wanted and available zones and by posting specific messages); and (d) intelligently manage intra- and inter-organisational information and knowledge (e.g. through performance improvement zone). Thus, the SMCs will be far better equipped to improve and maintain their competitiveness, and deliver effective and efficient projects ensuring VFM.

The overall framework and general concepts in management models and e-tools developed for this project could be intelligently transplanted to other stakeholders (e.g. large contractors), with suitable extensions and adaptations. It is therefore expected that other ‘controlling’ stakeholders (e.g. clients, consultants and large contractors) will gradually adapt and use some SMILE services. Major stakeholders will then be able to share even selected information and knowledge across a common resource platform. All stakeholders would then improve both their competitiveness and project VFM, and work collectively towards an improved construction industry in Hong Kong.

REFERENCES


