

RESEARCH BRIEF

2000/002

Building a World-class Construction Industry: Motivators and Enablers

RATIONALE OF THE STUDY

The construction industry in many parts of the world has a poor image. This is mainly the result of the industry's failure to achieve the expected performance level in delivering its finished product and its customer service. The accelerated change in nearly every aspect of the economy driven by technological developments in the manufacturing and service industries has fuelled several paradigm shifts in business management. However, construction is singled out as one that is still dominated by attitudes, technologies, processes, and a culture that are at least half a century old.

In Singapore, the difference between the performance of the construction industry and the other sectors of the economy in terms of quality, productivity and safety, among other criteria, has been highlighted in many studies and official publications. The most recent study is the investigation into the state of the construction industry undertaken by the Construction 21 Steering Committee, which comprised eminent persons representing all the relevant constituencies in both the public and private sectors of the industry. Its report, titled "Re-inventing Construction", and more commonly known as "Construction 21 (C21)", was published in October 1999. In the C21 report, the performance of the construction industry in Singapore is seen to lag behind those in countries such as Hong Kong, Australia, Japan and the US in many respects. Several recommendations were offered, under six strategic thrusts and the vision of creating a world-class industry, to enhance performance on construction projects in Singapore.

The C21 report is seen to provide a key milestone in the development of the construction industry. The report highlighted the main weaknesses and strength of the industry and its historical

development over the years. More importantly, the report examines the main initiatives that have been established to drive the industry to further improve its performance and image. The report provides key recommendations and targets for policies, legislation and key changes to the way the construction industry and its main stakeholders should aim to achieve in order to realize set levels of improvements.

This study builds on the work of the C21 Steering Committee and working groups, and the conclusions of the C21 report. It addressed the question of how Singapore's construction industry can change and improve itself.

AIMS AND OBJECTIVES OF THE STUDY

The aim of this research project is "to identify the engines for change to meet the challenges set by C21 for the construction industry in Singapore to become a world-class industry".

The research set out to achieve the following objectives:

1. Examine the level of awareness of the construction industry in Singapore of the main findings and recommendations of C21.
2. Examine the extent to which different sectors of the construction industry recognise problems, opportunities and challenges identified by C21, as relevant to their activities.
3. Identify the perceived barriers to the adoption by the construction industry of the C21 recommendations.
4. Examine respondents' expectation of future developments and changes to their companies' business activities and their business environment.

MAPPING OF THE RESEARCH RESULTS AGAINST THE C21 RECOMMENDATIONS

C21 Strategic thrust 1: Enhancing the professionalism of the industry	NUS research finding
Introduce common modules for engineering and architectural students to develop multi-disciplinary skills and build a foundation for future cooperation.	New graduates joining the company to be well informed about areas outside their immediate field of expertise.
Professional and trade groups in the construction industry to make Continuing Development (CPD) programmes mandatory for the renewal of professional and trade membership.	Your company should require each member of staff to attend a set number of hours/activities of Continuous Professional Development (short courses, seminars, conferences) every year.
	Additional qualification should become one of the main criteria for promotions within your company.
Contractors, project managers and developers to draw up codes of conduct and acceptable practices for their groupings. An industry-wide code of conduct spelling out industry standards with regard to the working relationships among the various players can be established thereafter.	A national code of conduct for professionals needs to be set-up to cover responsibilities, obligations, competence and impartiality.
	Company needs to set its own code of conduct for professionals.
Promote, recognise and award creativity, quality work and innovation through existing and new awards.	Provide incentives for staff to try out new ways of work and be more innovative.
	Your company and staff to enter national and international competitions that recognise innovation and creativity.
	Improve the level of understanding between the different professions in the company.

C21 Strategic thrust 2: Raising the skills level	NUS research finding
Set a target for 45% of construction workers to be skilled (i.e. attained at least the Skills Evaluation Certificate) by 2005, and raising the proportion to 60% by 2010. MOM to impose this as a requirement for work permit applications.	The level of skills within a company to be used by clients as one of the criteria for choosing a contractor, consultant or supplier.
Industry to work with BCA to devise appropriate incentive schemes for training workers.	Develop in-house training programmes in management skills.
	Develop in-house training programmes in IT skills.
	The government should provide incentives to help employers to invest in training programmes.

C21 Strategic thrust 3: Improving industry practices and techniques – BUILDABILITY	NUS research finding
Set minimum buildability score for building plan approval. Minimum buildability score should be raised progressively over time.	The client to set buildability as one of the criteria to select a consultant.
	The designers' terms of engagement to specify the buildability level of design.
	Increase the use of Design and Build procurement system.
	The government to introduce new regulations that demand new and improved practices and techniques.
	Develop better coordination between contractors and suppliers during the construction stage.
	Clients to be more interested and involved during the design and construction stages of the project.
	Closer cooperation among designers, contractors, specialist contractors, material suppliers and component manufacturers during the design stage.
	Educate clients to enable them to make more effective contribution to the design and construction processes.
Use appropriate incentive schemes such as the Industry Productivity Fund, to encourage the use of prefabrication and assist suppliers of prefabricated components.	Designers to develop more buildable designs.
	Improving the reliability of the supply of materials and manufactured (prefabricated) components.
	Increase use of standardised and prefabricated materials and components in construction

C21 Strategic thrust 3: Improving industry practices and techniques – QUALITY	NUS research finding
Continue to cultivate among professionals, contractors and end-users the awareness of quality products and good design through programmes such as CONQUAS 21 and BCA Good Practice Guides.	Client should set the target median CONQUAS score to be at least 79 by year 2005.
	Use of CONQUAS to measure the quality of construction work on all projects.
Develop a set of national quality specifications.	SCAL should create “best practice” networks that would enable learning and exchange of knowledge between companies in non-sensitive areas.
	Greater involvement of the client in the development of design and the construction process.
	Set a target for the company to become a Total Quality Management organisation.
	Abandon CONQUAS and concentrate on creating a quality culture within each company.

C21 Strategic thrust 3: Improving industry practices and techniques – SAFETY	NUS research finding
Introduce the Construction (Design and Management) Regulations after the enactment of the Occupational and Safety Health Act (OSHA) in 2000/2001.	BCA to assess contractors' safety management systems for the purpose of registration.
	Government to regulate both design and construction more stringently to ensure improved safety on construction sites.
	Establish safety management systems at corporate level in the company.
	Make designers and consultants legally responsible for health and safety.
	Provide harsher penalties for contractors and subcontractors who flout health and safety requirements on construction sites.
	Reduce the number of unskilled foreign workers on site.
Develop a pool of supervisors trained in proper site management and safety procedures to ensure high productivity and safety levels.	Singapore Contractors Association Limited (SCAL) to include safety assessment for registration of subcontractors and trades under the Singapore List of Trade Subcontractors (SLOTS).
	The client to examine tenderers' safety record as one of the selection criteria.
	Encourage major developers to demand improvement in safety and health.
	Tertiary institutions to provide more education in safety and health.

C21 Strategic thrust 3: Improving industry practices and techniques – MAINTAINABILITY	NUS research finding
Commission a study to research and devise a system that can be used to audit maintenance costs and produce manuals which give the design life and maintenance costs of components.	Provide training and development programmes on maintainability.
	The construction industry to develop guidelines for designers on how to achieve high maintainability.
	Make available adequate performance and cost data to address the client's requirements over the whole life cycle of the building/structure.
	Designers and suppliers to provide information on maintainability of elements of the structure, materials and components to assist decision-making.
	Establish a new maintainability score similar to that for measuring buildability.
	The client to choose a successful tender based on whole life cycle cost rather than just the initial cost.
	Extend the defects liability period of structures/buildings beyond the current one year.

C21 Strategic thrust 3: Improving industry practices and techniques – R&D	NUS research finding
Establish a National Construction Research Institute (NCRI) to coordinate construction R&D.	Establish “innovation” networks for companies to share non-sensitive technological advances and new ideas.
	Introduce a levy on all contracts to fund a central construction R&D organisation.
	Professional bodies to set up their own R&D units to lead the development within each profession.
	Establish an industry-sponsored body to share the risks of innovation.
	Assigning a government-sponsored body to share the risks of innovation.
	Companies and professional bodies to establish closer links with research groups at universities to tap into leading edge technologies and knowledge.

	Establish a government-sponsored body to lead and coordinate the industry's R&D effort.
	Provide sufficient tendering period to allow tenderers and consultants to develop new ideas.
	Procure more contracts based on Design and Build method.
	Promote increased cooperation among organisations involved in construction to coordinate innovation effort within a particular project.
	Increase tax incentives for companies, which invest in new construction technologies and management systems.
	Your company to pay for staff to attend national and international seminars, conference and training courses.
	Your company to require staff to use the latest IT applications to replace traditional methods of working.
	Your company to establish a reward system to recognise innovators and promote innovation.
	Your company to create a "no-blame" culture to encourage staff to experiment with new ideas.
	Your company to give staff a "slack" in their workload to give them an opportunity to develop and experiment with new ideas.

C21 Strategic thrust 4: An integrated approach to construction	NUS research finding
Develop a generic Construction Management System for all contractors and subcontractors and use appropriate incentive schemes to assist adoption of system.	Contractors, subcontractors and suppliers to adopt construction management systems that are compatible to ensure the smooth running of projects.
BCA should continue to encourage integration of construction activities through the promotion of design-and-build (D&B) arrangements.	The adoption of Design and Build procurement method by clients.
To review the tendering system for D&B to make it more transparent and minimise wastage. This can be achieved through the provision of an open system of information sharing.	A cultural change within the industry promoting a win-win attitude in construction contracts.
Encourage the formation of multi-disciplinary firms in order to groom a core of internationally competitive firms with D&B expertise.	Enable contractors and consultants to expand to provide a "one-stop-service" to clients by becoming a multi-disciplinary firm, i.e. offering architecture, engineering and construction services.
	Ensure that IT applications and systems adopted by the different organisations on a project are compatible.
	Develop a robust plan to introduce IT across the company.
	Clients to play a more active role during the design and construction stages.
	Earlier involvement of specialist contractors in projects.
	Adopt e-commerce and other electronic systems for exchange of information and ordering material/ service across the supply chain.
	The risks and responsibilities as well as benefits of greater integration to be made clear to all organisations involved in construction projects.
	Greater recognition of the role of specialist contractors.

C21 Strategic thrust 5: Developing an external wing	NUS research finding
BCA to assist construction companies and consultancy firms in venturing abroad through existing schemes.	Your company to work in partnership with Government-Linked Companies (GLC) to seize opportunities overseas.
	Government to provide further financial help and support to companies seeking to work internationally.
	Further tax changes to be introduced to reward companies who take the risk of working overseas.
	More information and intelligence about the international markets and opportunities to be made available by BCA, EDB and TDB.
The Construction Industry Joint Committee (CIJC) to encourage companies to take proactive efforts, and form consortia, to venture abroad.	Your company should identify strategic allies to form consortiums, to pool resources and knowledge together.
	Your company to recruit staff who are willing to work outside Singapore.
	The company to recruit staff who have greater understanding of the cultural differences and international practices.

CONCLUSION OF STUDY

The results of the survey that examined the impact of the C21 report on the construction industry found that the industry at large is not fully aware of the details of the report; 17% of the respondents had not heard about it. Of those who had heard about it, only 10% had read the complete report. **Therefore, the study recommends a more effective dissemination programme to inform the industry of the rationale and philosophies of C21.** This programme should include discussion forums and feedback on the barriers and enablers for greater improvements.

The study has identified several key enablers that would help the industry to achieve improvements in many areas. However, there is a feeling that the construction industry has too many legislation and regulations. There was a consensus that efforts for improvement should not be focused on meeting and satisfying legal requirements. Instead, the driving force should be the desire to provide an improved service to the customer. These two are not necessarily the same.

The one issue that underpins many of the potential solutions is that sustained improvement in a market driven economy can only be achieved by creating the market forces that would demand these improvements. **Therefore, the study recommends that an effective approach to improve construction business is to adopt a market driven agenda aimed at delivering changes and improvements that are focused on providing better value products and services to the customer.**

Here, improvement will be driven by economies and business success. Attracting, satisfying and maintaining customers will be the key strategic thrust for any business organisation. The customer can exercise this power to drive improvement directly or through the "client" to provide leadership for the project. A customer-oriented leadership will promote and enforce an agenda that focuses on satisfying customer needs and requirements. The issues of quality, safety, maintainability, buildability, integration and innovation will become business priority for firms involved in construction. These issues will become a key determinant of business success in the industry. Business success comes only from having customers who are not only satisfied, but are also delighted with the product and service.

1. **To effect change in attitudes and mindsets, this study recommends that big customers will need to take a more effective leadership.** The biggest clients of the industry will need to adopt practices that would enable a cultural change in the key area of contracting. The industry has identified the problem of clients focusing on lowest cost as a major impediment to

improvement. The public client and other larger private developers can take the lead by propagating practices and new procurement frameworks that would enhance the ability of the industry to provide better value and more innovative services and products.

2. **For this leadership to be effective this study recommends the development of key enabling mechanisms.** First, clients should be provided with access to "innovation centres" where they can gain knowledge of key developments in the services, products and mechanisms of delivery available in the industry. Secondly, strategies and processes should be developed to encourage active participation from customers. Thirdly, professionals should be provided with the tools and methods that they can use to enable the customer's expectations and requirements to be the focus of business, design, manufacturing and construction processes. Fourthly, construction firms should seek to develop a customer-oriented culture that would most effectively and efficiently create the necessary behaviour for the creation of superior value for customers (see figure 1).

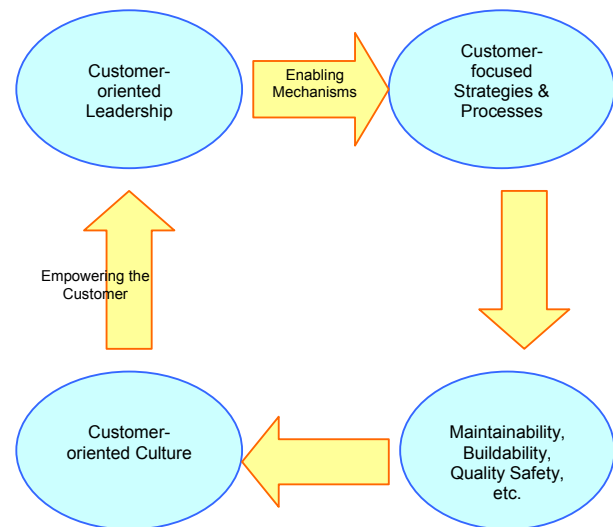


Figure 1. Model of a Customer-oriented Approach in Construction

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