aims to become the hub of project management in the Region and develop close links with the industry in pursuing collaborative research and high-level consultancy projects
# Project Management

<table>
<thead>
<tr>
<th>Name</th>
<th>Research interests and area of expertise</th>
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<tbody>
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<td><strong>Co-ordinator</strong></td>
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<tr>
<td>Ir. Prof. Albert P.C. Chan</td>
<td>Project management, international construction projects, construction engineering management, construction procurement, and construction safety</td>
</tr>
<tr>
<td>MSc(Aston), PhD(S.Aust), FHKIE, MAIPM, FCIOB, FAIB, FHKCM, MIEAust, AAIQS, MRICS, RPE(Bldg)</td>
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<tr>
<td><strong>Members</strong></td>
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<tr>
<td>Prof. Edwin H.W. Chan</td>
<td>Property development control framework, construction law, administrative and regulatory systems for construction, and dispute management</td>
</tr>
<tr>
<td>BA(A5)(Hons), MA(Arch), LLB(Hons), PgD(PR Law), PhD, Barrister Finals, MBEng, F.PFM, FHKArb, RIBA</td>
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<tr>
<td>Prof. Stephen W.K. Mak</td>
<td>Construction economics, risk management, and information technology</td>
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<tr>
<td>BSSc, MSc, PhD, AAIQS, FAIB, MHKCS, PMP</td>
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<td>Construction safety management and affordable housing development</td>
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<tr>
<td>BSc(Hon)(Brighton), MSc(Arch) (London), PhD, FHKIE, FHKICM, RPE(Bldg), FCIOB, MCI Arb, MIMgt, MIOSH</td>
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<tr>
<td>Dr. Daniel W.M. Chan</td>
<td>Construction time performance, procurement systems, project partnering and strategic alliancing in construction, construction site safety management, public private partnership, guaranteed maximum price, and target cost contracting</td>
</tr>
<tr>
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<tr>
<td>Dr. Linda C.N. Fan</td>
<td>Professional ethics in construction, strategic alliance and project partnering, joint venture and procurement systems in China, benchmarking, innovation in construction, and quality management in construction</td>
</tr>
<tr>
<td>BSc(Hons), MSc, DBA, ADipC, FCIOB, FHKIE, FASl, MRICS, MAPM, FHKA AST, RPE(Bldg)</td>
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<tr>
<td>Dr. Patrick S.W. Fong</td>
<td>Managing knowledge in projects and professional service firms, and managing stakeholders’ values in projects</td>
</tr>
<tr>
<td>BSc(Hons), MSc, PhD, MRICS, MHKIS, MIVM, MHKIVM</td>
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<tr>
<td>Dr. Patrick T.I. Lam</td>
<td>Project financing, construction contracts and specifications, quality and buildability issues, and dispute resolution</td>
</tr>
<tr>
<td>PhD, MSc, Associateship(HKPoly), Dip.Finance, MHKIS, MHKIE, MHKICM, MSISV, MSI Arb, MRICS, MCI OB, RPE, RPS, CCE</td>
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<tr>
<td>Dr. Andy K.D. Wong</td>
<td>Building information modelling</td>
</tr>
<tr>
<td>AP(HK), PhD, MCI OB, M H K I E</td>
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</table>
Research Areas
1. Delivering successful projects.
2. Flexible approaches to tendering and project delivery.
3. Impact of procurement systems on project performance.
4. Tools for planning and monitoring trust and commitment between teams undertaking construction projects.
5. Partnering and public private partnerships (PPP).
7. Knowledge management.
8. Assessment of buildability.

Consultancy Services
1. Facilitating partnering workshops for property developers and construction contractors.
2. Design and running of in-house project management training programmes.

Future Development

Development targets
The Project Management Group aims to become the hub of project management in the Region. We will continue our close links with industry in pursuing collaborative research and high-level consultancy projects in various project management issues, including delivering successful projects, project and construction financing, and time and quality management.

Key topics to be completed/developed
1. Developing a best practice framework for project partnering - A comparative study of Australia and Hong Kong.
2. Developing a best practice framework for implementing public private partnerships (PPP) in Hong Kong.
3. A conceptual model of success for design and build projects in the public sector of Hong Kong.
4. A benchmark model for maintenance projects in Hong Kong.
6. Critical success factors for health-care projects in Hong Kong.
7. Quality relationships in public housing.
8. A construction time prediction model for high-rise private residential developments.
9. A comparative study of project partnering practices in Hong Kong.
10. An investigation of Guaranteed Maximum Price (GMP) and Target Cost Contracting (TCC) procurement strategies in Hong Kong.
11. Exploring the key risk factors and risk sharing mechanisms for Guaranteed Maximum Price (GMP) and Target Cost Contracting (TCC) schemes in Hong Kong.
12. Repair, maintenance and sustainability of the ageing residential building stock in Hong Kong.
13. Knowledge creation in multidisciplinary project teams in construction.
15. Dynamics of knowledge sharing in professional service organisations in construction: Implications for utilisation of knowledge management systems.
A Comparative Study of Project Partnering Practices in Hong Kong

Research Team: Albert P.C. Chan, Daniel W.M. Chan, Linda C.N. Fan, Patrick T.I. Lam and John F.Y. Yeung

Research project funded by CII-HK in 2003 to 2004

Keywords: Project partnering, partnering framework, comparative study, Construction Industry Institute, Hong Kong (CII-HK)

Background

Building works have long been delivering in a traditional manner where clients appoint consultants to act on their behalf. Traditional general contracting and other forms of procurement such as “Design-and-Build” and “Build-Own-Operate” are highly structured and susceptible to adversarial relationships that can last the life of a project. This type of adversarial relationship can give rise to construction delays, difficulty in resolving claims, cost overruns, litigation, and a win-lose climate (Moore et al. 1992). Many of these issues reflect a lack of communication amongst project participants, and epitomize the adversarial relationship existing at all levels and in many instances in the construction industry. Many new management techniques have gained popularity to help solve these hurdles. Partnering is one such technique, which attempts to create an effective project management process between two or more organisations. It aims to generate an organisational environment of trust, open communication and employee involvement (Sanders and Moore 1992).

Significance of the project

Although many studies related to the practice and development of project partnering have been conducted in other countries, little if not any, has been done in the Hong Kong context. In order to make up for this deficiency, empirical data on project partnering in Hong Kong was collected and analysed. Advanced understanding on the best practices leading to successful partnering ventures was gained upon completion of the project. The research project could improve the delivery of construction projects using project partnering in both the public and private sectors. This could, in turn, increase value for construction money, enhance international competitiveness of the industry, and encourage the level of investment in construction.

Aims and objectives

This research project aims to conduct a comprehensive comparative study of partnering
practices amongst public, private and infrastructure sectors based on some cited partnering projects recently completed in Hong Kong. The specific objectives are to:

1. Investigate the partnering process in the cited public, private, and infrastructure sector projects in terms of organisational structures, duties and responsibilities of the parties involved, lines of communication, control of mechanisms and types of partnering charters used.
2. Evaluate the perception of clients, consultants, contractors, suppliers, and subcontractors for their satisfaction criteria, and why project partnering is favoured.
3. Provide a means to measure and evaluate the performance of partnering with respect to the criteria of satisfaction.
4. Compare project partnering practices amongst public, private and infrastructure sectors.
5. Provide effective guidelines for successful partnering implementation to suit the Hong Kong construction industry. The guidelines include best practices and potential pitfalls.

A typical partnering framework for Hong Kong construction projects. [adapted from the Latham's (1994) Report]

Outcome and deliverables

This project delivered a set of practice reports and guidance notes to improve the effectiveness of partnering. The deliverables are of significant relevance to the collaborating firms, public and private sectors, and the construction industry in general. In particular, they have benefited from:

1. Provision of a more structured procedure and a set of criteria for evaluating partnering arrangements.
2. Provision of a means to monitor and evaluate the success of partnering projects.
3. Comparison of project partnering practices amongst public, private and infrastructure sectors.
4. Provision of useful and practical conclusions from this comparative study for reference by all CII-HK members.
5. Provision of the contents of research outcomes for subsequent dissemination at the discretion of the CII-HK.

Research monographs


Refereed journal articles


Refereed conference papers


successful partnering venture? A case study of one Peking Road project in Hong Kong. *Proceedings of the CII-HK Conference 2004 on Construction Partnering: Our Partnering Journey - Where Are We Now, and Where Are We Heading?,* 9 December 2004, Hong Kong, China, 97-103.


Research highlights

The major findings in this project are highlighted below:

1. Most case study projects adopted a structured partnering process, which includes one initial workshop, one or more interim workshops, and one final workshop. One project applied an unstructured partnering approach, but turned out to be equally successful.

2. Both the private and public sector projects engaged external facilitators whilst the infrastructure sector projects engaged both external and in-house trained facilitators for the partnering workshops.

3. All six case study projects were completed on time (with two infrastructure projects being ahead of schedule by 5%), at reasonable costs and to satisfactory quality.

4. The infrastructure sector exhibited the most outstanding overall project performance, which implied that it benefited a lot from partnering implementation. This can be attributed to the systematic approach of implementing partnering, and method-related nature of civil, and electrical and mechanical (E&M) installation works, which entail a lot of discussion and co-ordination amongst the interfacing project participants. Partnering can be applied to the fullest possible extent by launching more interim workshops and reviews at all levels organized by external and in-house trained facilitators. Conversely, the benefits of partnering for building works were less pronounced because of the more standard construction methods and technology used in practice.

5. The private sector had the highest scores for quality performance and professional image establishment. Partnering was instrumental in shaping a professional image among counterparts by achieving quality and prestigious construction.

6. The public sector depicted lower efficiency in implementing partnering indicating that emphasis on accountability may reduce flexibility in procedural matters to some extent.

References


Developing a Best Practice Framework for Implementing Public Private Partnerships (PPP) in Hong Kong

Research Team: Albert P.C. Chan, Patrick T.I. Lam, Daniel W.M. Chan, Tony Sidwell and Esther Cheung

Research project funded by RGC CERG in 2006 to 2008

Keywords: PPP, government, public sector, private sector, Hong Kong

Background

Public Private Partnership (PPP) is a general term covering all contracted relationships between the public and private sectors to produce an asset or deliver a service. Its major advantage is to utilise resources from the private sector to allow the financial burden to be lifted from the government. Along with the other many advantages of PPP, political risk often holds the government back.

Since the handover of Hong Kong from the British to the Chinese, Hong Kong has experienced many difficulties with adopting the new government. These political differences have impose pressure on the local government’s budget. With the continuous call for better public services due to the rapid development of Hong Kong, alternatives need to be sought. Hong Kong has the advantage of being the international gateway to China that has attracted companies to base their offices in Hong Kong for the Asia market. As a result, the private sector has much to contribute.

Local practitioners have also shown a strong interest in being involved in PPP projects. It has been seen from overseas experiences that the private sector will also benefit in terms of financial profits from large-scale projects which could only be possible under this type of procurement method.

Previous projects in Hong Kong have been known to utilise similar approaches to PPP. The local government has realised the benefits of using PPP in Hong Kong as well as the success achieved overseas. But much thorough research is needed to develop the most suitable practice in terms of project nature, project complexity, project type and project scale under which PPP is most appropriate for Hong Kong based on the lessons learned from the UK and Australia.
Significance of the project

Although PPP has been practised in the UK and Australia for around a decade and numerous construction and building projects are employing the concept, not all these PPP projects are equally successful. The need for identifying critical success factors for PPP projects is becoming more urgent. Since the HKSAR Government is experiencing stringent budgetary pressures but remains subject to demands for more and better public services, a key part of the solution is to enhance radically the use of private sector in delivering government services. Ever since, the various interest groups (including the candidates for the 2004 LegCo Election-Engineering Functional Constituency) have been debating over whether, and if so where, this type of procurement should be given a seat in Hong Kong. The use of PPPs has attracted heated debates among the local engineering and surveying professions. Therefore, it is worthwhile to undertake a comprehensive study of PPP and Private Finance Initiative (PFI) implementation in Hong Kong. Despite the amount of interest vested with PPP, actual empirical research is rather thin on the ground, and empirical evidence concerning PPPs in practice has largely been piecemeal and anecdotal. There is a need for more systematic and in-depth research to examine the nature, efficacy and feasibility of PPP procurement approaches. While the HK PPP Guide identifies many key issues that will have to be considered in the context of a PPP project in Hong Kong, it is not definitive about the way in which these issues are to be resolved. A best practice framework for implementing PPPs would be crucial and useful in this respect. This research also forms a sound basis for a comparative study of public infrastructure procurement utilizing PPP among the UK, Australia and Hong Kong.

Aims and objectives

This research project aims to evaluate the merits and shortcomings of PPP, determine the best conditions in adopting PPP, as well as to develop a best practice framework for implementing PPP based on the lessons learned from the UK and Australia. The following objectives were identified to reach the project aim:

1. Develop a series of Key Performance Indicators (KPIs) to evaluate the success of a PPP project.
2. Set up a database of construction projects where PPP is applied in the UK, Australia and Hong Kong, and conduct a comparative analysis on the PPP practices and their performances.
3. Evaluate the merits and shortcomings of applying PPP compared with other procurement approaches.
4. Investigate the best conditions in terms of nature, complexity, types and scales of projects under which the use of PPP is most appropriate.
5. Identify a list of Critical Success Factors (CSFs) contributing to the success of these projects.
6. Develop and validate a best practice framework for PPP implementation in Hong Kong.
7. Disseminate the research findings via publication of best practice guidelines.
Outcome and deliverables

A best practice framework for applying PPP in Hong Kong will be developed. At the same time a comparative study will be formed across Australia, Hong Kong and the UK. During the research, the KPIs, CSFs and case studies of PPP construction projects will be identified in all three studied places.

Benefits to community/government

This research study will help local practitioners and the government to understand PPP to a further extent. It will provide the industry the knowledge and skills required for being involved in a PPP project in Hong Kong. Moreover, it also introduces international expertise for applying PPP in Hong Kong construction projects. The understanding of PPP will hopefully open more avenues for both the public and private sectors in Hong Kong.

Hong Kong’s first BOT project - The Cross Harbour Tunnel (operation in 1972)

The latest PPP project in Hong Kong - Asia World Expo (operation in 2005)
A Benchmark Model for Maintenance Projects in Hong Kong

Research Team: Albert P.C. Chan, Daniel W.M. Chan and Edmond W.M. Lam

Research project funded by PolyU Competitive Research Grant in 2005 to 2007

Keywords: Benchmarking, critical success factors, key performance indicators, maintenance, Hong Kong

Background

In recent years, there is an increasing number of ageing buildings which may either be demolished for redevelopment or kept to maintain their proper functions (Table 1). Selling the building will only be considered as long as the owner profits financially from it. As a result, building repairs and maintenance play very important roles in maintaining built assets. In fact, maintenance and management are two closely related issues. Building management, apart from covering the basic security and cleanliness aspects of buildings, should also coordinate or even include implementation of maintenance plans to ensure a safe and pleasant living environment. However, most maintenance management systems lack the possibility of assessing maintenance performance levels in planned maintenance, and the performance of safety has precedence over work for aesthetic or sustainable reasons.


<table>
<thead>
<tr>
<th>Year</th>
<th>Construction work at construction sites (a)</th>
<th>*Construction work at locations other than sites (b)</th>
<th>Total construction work (c)</th>
<th>Percentage of (b) to (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>82,525</td>
<td>20,718</td>
<td>103,243</td>
<td>20.067</td>
</tr>
<tr>
<td>2001</td>
<td>79,223</td>
<td>20,637</td>
<td>99,860</td>
<td>20.666</td>
</tr>
<tr>
<td>2002</td>
<td>75,871</td>
<td>20,599</td>
<td>96,470</td>
<td>21.353</td>
</tr>
<tr>
<td>2003</td>
<td>73,082</td>
<td>20,058</td>
<td>93,140</td>
<td>21.535</td>
</tr>
<tr>
<td>2004</td>
<td>61,954</td>
<td>23,900</td>
<td>85,854</td>
<td>27.838</td>
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</tbody>
</table>

* Construction work at locations other than sites includes the general trades such as decoration, repair and maintenance, and construction work at minor work locations.

Project success means different thing to different people (Freeman and Beale, 1992). In fact, the Key Performance Indicators (KPIs) reflect a set of focused criteria that represent the organizational performance most critical to the success of the organization, and the identification of Critical Success Factors (CSFs) enables project team leaders to make improvements in project management areas. However, little, if any, research has been
done on maintenance projects, and most maintenance research focuses on safety in construction, selection of appropriate maintenance tasks and priority setting in planned maintenance (El-haram and Horner, 2003; Shen and Spedding, 1998). Apart from the assessment for planned maintenance works to tackle the problem of the lack of maintenance funds, it is equally important to ensure that the performance of maintenance projects can satisfy the success criteria of project participants. Still, the general concept of project success remains ambiguously defined and there is a lack of comprehensive lists of criteria contributing to success for maintenance projects. The factors that are critical to the success of a project are often discussed in a piecemeal one-off manner, which makes it difficult for project participants to identify and evaluate the critical components in a project. Buildings in Hong Kong are ‘ageing’ and the growing concern on benchmarking the performance of maintenance projects has brought about a need for the research.

**Significance of the project**

The problems of managing maintenance projects resulted in loss of lives and property. The study of success for maintenance projects has brought along with it several benefits. This study is expected to be a positive contribution to the investigation of the performance of maintenance projects in construction and the related management issues. The development of a conceptual model of success for maintenance projects can help to assess whether a given project is a success or a failure, and the identification of critical success factors can enhance the chance of success for future projects. Such a study can set a benchmark for research in managing existing buildings and provide a further research platform for global comparisons.

**Aims and objectives**

The primary aim of the proposed research project is to establish ‘industry norm’ for the performance of maintenance projects in Hong Kong and the research study is set out to serve the following objectives:
1. Evaluate the problems of running maintenance projects.
2. Formulate a framework of factors and criteria of success for maintenance projects.
3. Compute an index to indicate the success level of a maintenance project.
4. Identify those factors that have strong predictive powers for the success of maintenance projects.
5. Develop a conceptual model to link the critical success factors to the performance of maintenance projects.

Outcomes and deliverables

The expected outcomes of this study include:

1. A better understanding on the local practice of running maintenance projects.
2. Closer attention to the major problems of running maintenance projects to formulate more effective project management tools.
3. The identification of Key Performance Indicators (KPIs) for project participants to attain success for their maintenance projects.
4. The computation of Project Success Index (PSI) for maintenance projects as an indicator to assess whether a maintenance project is a success or a failure.
5. The identification of Critical Success Factors (CSFs) to provide participants with a focus for what they should be aware of in order to ensure the success of a maintenance project.

such that a ‘best practice’ framework can be developed for implementing successful maintenance projects in future.

Refereed conference paper


Benefits to community/government

In Hong Kong, the government suggests the integration of proper maintenance with effective management for existing buildings (Housing, Planning and Lands Bureau, 2003). The Construction Industry Institute, Hong Kong (CII-HK) plays a significant role in helping to determine the future core directions for research projects. Moreover, research on repair and maintenance for existing buildings has been identified as the most prominent theme that the construction industry would like to focus on. The research provides an in-depth study of the management of maintenance projects in Hong Kong, and its findings are believed to be influential to knowledge development and applicable to maintaining existing buildings. The results of this work can be used by building clients, construction management teams and project management consultants to establish benchmark measures for achieving success in maintenance projects. The pool of maintenance projects also enables project participants to know the relative positions of the performance of their projects so that improvements can be made. Construction companies can therefore benchmark their performance to identify their strengths and weaknesses.
References


Developing a Best Practice Framework for Construction Partnering - A Comparative Study of Australia and Hong Kong


Research project funded by RGC CERG in 2005 to 2008

Keywords: Partnering, alliancing, key performance indicators, critical success factors, culture, Hong Kong, Australia

Background

The construction industry is a competitive and high-risk business with many problems such as little co-operation, limited trust, and ineffective communication often resulting in a confrontational relationship amongst all project stakeholders. This type of adversarial relationship can give rise to construction delays, difficulty in resolving claims, cost overruns, litigation, and a win-lose climate (Moore et al. 1992). Since late 1980’s, professional bodies started to recognise that if the construction industry was to compete for investment funds, in particular internationally, both the operating methodology and the public image of the construction industry would have to be improved. Over the past two decades, partnering has been acknowledged widely as an innovative approach to the procurement of construction services in the industry.

In spite of the fact that there are numerous benefits of adopting partnering, it is not easy to implement it successfully because changing old habits and building trust are not magically going to appear (Cowan et al. 1992). People have to make it work and the sceptics are plentiful at the beginning. It is of interest to note that partnering cannot solve all the problems in the construction industry. Its success is totally dependent on the people who drive it (Slater 1998). Partnering is culturally opposed to the traditional implementation of construction projects. Established culture is hard to change (Hellard 1996, Lazar 1997). Many organisations are reluctant to change into an integrating culture. Very often, bureaucratic organisations impede the effectiveness of partnering (Larson and Drexler 1997). When parties are faced with commercial pressure, they may compromise the partnering attitude. Studies on how to ensure success in partnering projects as well as investigating the cultural impact of good partnering performance are becoming more urgent.

Significance of the project

Though partnering has been practised in Australia and Hong Kong for more than a decade and quite a lot of construction and building projects are adopting the concept, not all partnering projects are equally successful. The need to identify critical success factors for partnering and alliancing projects is becoming more urgent. Earlier research (Chan 1998)
indicated that the differences between Australia and Hong Kong, in terms of culture, politics, regulations, economic conditions, and construction practices, have a significant impact on project performance. Likewise it is assumed that such differences will have similar impacts on partnering. Therefore a comparative study on best practice partnering will be useful to those who wish to enter the globalised market in general and to practitioners and academics in Australia and Hong Kong in particular.

Although numerous researchers are keen on studying partnering, actual empirical research is rather thin on the ground, and empirical evidence concerning partnering in practice has largely been piecemeal and anecdotal (Bresnen and Marshall 2000). There is still a need for more systematic and in-depth research which examines the nature, efficacy and feasibility of a partnering/alliancing approach. Empirical data on partnering/alliancing in Australia and Hong Kong will be collected and analysed. New understanding of the best practices leading to successful partnering ventures will be gained upon completion of the project. The research project could improve the delivery of construction projects using partnering/alliancing approach. This could, in turn, increase the value of construction money, enhance the international competitiveness of the industry, and encourage a higher level of investment in construction.

Aims and objectives

This research project aims to compare and contrast the partnering practices in Australia and Hong Kong and to study the cultural impact on partnering performance. The specific objectives are to:

1. Develop a series of Key Performance Indicators (KPIs) to evaluate the success of a partnering/alliancing project.
2. Set up a database of construction projects where partnering/alliancing is applied in these countries and conduct a comparative analysis on the partnering/alliancing practices and their performance.
3. Identify a list of Critical Success Factors (CSFs) contributing to the success of these partnering/alliancing projects.
4. Investigate the cultural impact on partnering/alliancing practice and its performance.
5. Develop and test a best practice framework for partnering/alliancing projects.
6. Disseminate the research findings via publication of best practice guidelines and by organizing a series of partnering workshops.

Overall Research Framework for the Study [Source: Adapted from Walker, 1997]
Outcome and deliverables

The proposed deliverables of this study include the following:

1. Developing a series of weighted KPIs to evaluate the success of partnering/alliancing projects.
2. Establishing a comprehensive database of construction partnering/alliancing projects in Australia and Hong Kong.
3. Identifying a list of CSFs contributing to the success of partnering/alliancing projects.
4. Understanding the cultural impact on partnering/alliancing practices and performance.

Refereed conference paper


References


Forecasting Manpower Demand in the Construction Industry of Hong Kong

Research Team: James M.W. Wong, Albert P.C. Chan and Y.H. Chiang

Keywords: Construction industry, forecasting model, manpower planning, skill requirements, Hong Kong.

Background

The construction industry is important to continued residential, commercial and infrastructural development in Hong Kong. The industry has made significant contributions to the economy, in terms of output and the share of the workforce involved (Rowlinson and Walker 1995). Figure 1 reveals the trends of the total number of employed persons in the construction industry and the ratio of the active labour force over the past twenty years. The construction employment in Hong Kong has increased dramatically since 1985, reaching a peak of 315,100 in 1998 and fell to 257,400 in 2004 owing to the reduction in the construction workload and the downturn in the property market.

Rapid changes of the economy, working arrangements, and technology in construction advocate reliable estimations of manpower demand to lessen future skills imbalance (Bartholomew et al. 1991). Forecasting of the skill requirements appears to be the means of an adequate resolution as there is no doubt that to facilitate human resources planning and budgeting, an organisation must precisely determine the demand for personnel in individual disciplines in advance. It would be, in the long term, naïve to depend upon importation of labour and expansion of investment in the construction sector to solve skill shortages and surplus, respectively. Rather, planning of the skill training holds the key to resolve the demand and supply balance (Schmidt et al., 2003). However, the reliability of the current construction manpower demand forecasts in Hong Kong has proved to be unreliable. A solid understanding of future skill needs for the development of the industry is still lacking.

Although the Construction Industry Review Committee Report (CIRC 2001) has addressed the importance of a sound mechanism for projecting construction manpower supply and
demand, lack of research still confuses manpower planning especially on methodology for compiling and exploiting manpower statistics to facilitate manpower forecasting, and to provide a reliable consistent basis for reference by policy-makers and the industry. The EMB (2000) and CIRC (2001) also recommend developing a detailed econometric model to produce short- to medium-term manpower forecasts in Hong Kong. To have a thorough understanding of the future labour market and to avoid structural unemployment or skill shortage, there is a genuine need to re-visit this very important concept of the demand for construction manpower. The above considerations provide the key initiatives for this study.

**Significance of the project**

This research contributes significantly to the area of manpower demand forecasting. The forecasting models developed in this study can benefit the construction industry by providing critical information on the future construction manpower requirements and assist policy makers and training planners to formulate training strategies. Apart from this practical use, the research also contributes new knowledge in the areas of manpower forecasting and planning. It enriches and updates the understanding of advanced forecasting methodologies for collating and compiling construction manpower statistics so as to facilitate manpower planning at project and industry levels. This study also explores valuable perspective on the link between macro and microeconomic factors which affect the demand for construction personnel. The research framework and methodology developed in this study can be replicated in a variety of cities in Mainland China and other Asian countries. This will provide a solid framework for conducting comparative studies in this region.

**Aims and objectives**

The aim of this research is to establish manpower demand forecasting models for the construction industry of Hong Kong. The main objectives of the research are to:

1. Critically review the previous and current manpower demand forecasting methods, both locally and overseas, as well as related studies in this area for the development of advanced manpower demand forecasting models.
2. Identify the stakeholders’ requirements of manpower forecasting models for the construction industry of Hong Kong.
3. Make reference to the available literature and statistics, and to study various factors affecting the manpower demand for deriving a construction personnel manpower forecasting methodology.
4. Develop, based on the methodologies established above, practical forecasting models for estimating the construction occupational demand at project and industry levels.
5. Assess the reliability and sensitivity of the newly developed models in order to facilitate subsequent calibration of the models to maintain their applicability.
Outcomes and deliverables

The deliverables of this study are listed as follows:

1. A comprehensive review of manpower demand forecasting methods and manpower planning practices in Hong Kong and overseas countries.
2. Stakeholders’ requirements of manpower forecasting models for the construction industry of Hong Kong.
3. A list of potential factors driving manpower demand at project and industry levels.
4. Manpower demand forecasting models for estimating the construction occupational demand at project and industry levels.
5. Forecasts of ex ante construction occupational demand based on the developed and validated forecasting models.

Benefits to community / government

At the project level, statistical models for forecasting the labour demand for a construction project were developed using multiple regression analysis. The forecasting models could serve as practical tools for contractors and government to predict the labour requirements and number of jobs created at an early outset, thus enabling proper human resources planning and budgeting. At the industry level, co-integration analysis and vector error correction modelling technique were applied to develop causal relationship between aggregate construction manpower demand and associated economic factors for forecasting purposes. Upon completion of the aggregate model, occupational share manpower demand models were established by means of time series modelling analyses. The industry-based forecasting models are useful to assess the future construction manpower requirements and assist policy makers for anticipating and adapting to business cycle-related fluctuations in this critical sector of the local economy, with the aim of lessening future skills mismatches and achieving a sustainable labour market.

References

An Investigation of Guaranteed Maximum Price (GMP) and Target Cost Contracting (TCC) Procurement Strategies in Hong Kong

Research Team: Daniel W.M. Chan, Albert P.C. Chan, Patrick T.I. Lam, Edmond W.M. Lam and James M.W. Wong

Research project funded by HK PolyU Faculty Internal Competitive Research Grant (October 2005 to December 2006)

Keywords: Guaranteed maximum price, target cost contracting, procurement strategies, gain-share/pain-share, Hong Kong

Background

The construction industry has long suffered from a lack of co-operation, limited trust and ineffective communication, often resulting in an adversarial working relationship amongst all project stakeholders, and eventually inducing poor project implementation in terms of time, cost and quality. In addition, because of the increasing demand on tight schedule, limited budget and project complexity, there is a strong call for changes in construction contracting. To achieve value for money in construction procurement, service providers and suppliers should be motivated or given incentives to provide value-added services, which are of material benefit to the end-users. The Report of the Construction Industry Review Committee (CIRC) published by the HKSAR in January 2001 indicated that better project performance can be achieved by the implementation of Guaranteed Maximum Price (GMP) and Target Cost Contracting (TCC) with a pain-share/gain-share arrangement.

The GMP/TCC contracting approach can be an effective means of motivating contractors to achieve better value and project performance by aligning their own financial objectives with the overall objectives of the project (CIRC 2001). Some recent local examples of GMP construction projects have been observed that include: Chater House, 1063 King’s Road, Alexandra House Refurbishment, Tradeport Hong Kong Logistics Centre, The Landmark Redevelopment Phase 6, Three Pacific Place, The Orchards, Australian International School and Hong Kong Park. The quasi-government mass transportation provider, Mass Transit Railway Corporation Ltd. (MTRCL) has been experimenting with the target cost contracting approach through their implementation of incentivization agreements (IA) with their main contractors and subcontractors for the Tseung Kwan O Railway Extension (TKE) contract (Bayliss 2002, MTRC 2003).

Although the literature about the practices of GMP/TCC in overseas countries is plentiful, there is very limited empirical research on GMP/TCC in the Hong Kong context. This study aims to investigate the applications of GMP/TCC contracting approach in the Hong Kong construction industry. Preliminary observations on GMP/TCC cases reflected that projects
were completed on time, within budget and with satisfactory quality. The TKE project was even completed 4 months ahead of schedule, with significant cost savings, fewer and earlier resolution of claims, more productive working environment and greater job satisfaction with far less time spent on pointless disputes (MTRC 2003). Therefore, it is worth exploring the GMP/TCC process for achieving construction excellence from those successful cases.

**Significance of the project**

Despite GMP/TCC have been practiced in the United Kingdom and Australia for several years, and a number of construction projects are employing the concept, not all these projects have been equally successful. There is still a lack of research evidence to evaluate the levels of success and lessons learned from those GMP/TCC projects. Hence, more systematic and comprehensive empirical case studies are needed to determine the motives behind, perceived benefits, potential difficulties, critical success factors, current practice framework, and key risk factors involved in implementing those GMP/TCC projects. GMP/TCC are relatively new in Hong Kong and so such a comprehensive investigation in relation to Hong Kong conditions is timely. This research can provide sufficient groundwork for construction clients to develop and test a best practice framework for GMP process or an incentivization scheme in future construction projects. It also forms a solid foundation for a subsequent comparative study of GMP/TCC practices between the United Kingdom, Australia and Hong Kong.
Aims and objectives

This study aims to investigate the applications of GMP/TCC practices based on reported literature and selected case study projects recently completed in Hong Kong. Specific objectives are to:

1. Investigate and compare the GMP/TCC practices amongst the selected projects and with other contracting approaches in terms of organisational structures, duties and responsibilities of the parties involved, control mechanisms and types of contracts used.
2. Explore the perceptions of clients, consultants, main contractors and subcontractors, on their evaluation criteria and the reasons why GMP/TCC is favoured.
3. Identify the potential risks involved in implementing the GMP/TCC approaches amongst all project stakeholders.
4. Establish a set of validated guidelines for successful implementation of GMP/TCC projects in the Hong Kong construction industry. The guidelines will help promote best practices and avoid potential pitfalls.

Project status

The research work of this project started in October 2005 and is anticipated for completion in December 2006.

Outcomes and deliverables

The deliverables of this study include:

1. A comprehensive database of the GMP/TCC construction projects and practice framework in both local and overseas context.
2. Evaluation of GMP/TCC procurement approaches including the approach and process of adopting GMP/TCC, the motives behind to implement GMP/TCC, benefits, risks, difficulties, critical success factors, project performance in comparison with traditional procurement approach, optimal project conditions for adopting GMP/TCC and future development, based on the perceptions of various project stakeholders.
3. Groundwork for construction clients to develop and test a best practice framework for GMP process or an incentivization scheme in future construction projects.
4. A set of guidelines and recommendations for successful implementation of GMP/TCC projects in the Hong Kong construction industry.

Since the project is still on-going at the time of compiling this brochure, dissemination of research findings is expected after project completion. To-date, one refereed journal article documenting the opinions on the application and performance of GMP/TCC procurement approaches from a series of face-to-face interviews is being compiled for submission and a refereed conference paper has been presented and published as indicated below:

Refereed journal article (under preparation)

Refereed conference paper


Benefits to community/government

This project provides an in-depth investigation of the lessons learned from previous GMP/TCC construction projects. The motives behind, perceived benefits, potential difficulties, critical success factors, current practice framework and key risk factors involved in implementing those GMP/TCC projects are also extensively explored. The research findings contribute significantly to new knowledge and practical information of novel contracting strategies for the Hong Kong construction industry. A set of validated guidelines and recommendations will be particularly useful for project stakeholders to consider implementing GMP/TCC procurement strategies in the future.

References


Exploring the Key Risk Factors and Risk Sharing Mechanisms for Guaranteed Maximum Price (GMP) and Target Cost Contracting (TCC) Schemes in Hong Kong

Research Team: Daniel W.M. Chan, Albert P.C. Chan, Patrick T.I. Lam and Edmond W.M. Lam

Research project funded by HK PolyU BRE Departmental Research Grant (March 2007 to February 2008)

Keywords: Guaranteed maximum price, target cost contracting, key risk factor, risk sharing mechanism, Hong Kong

Background

As a result of the increasing constraints on tight schedule, limited budget and project complexity, there is a strong call for changes in contracting procedures in construction. The Report of the Construction Industry Review Committee (CIRC) published by the HKSAR Government in January 2001 advocated that better project performance can be achieved by the adoption of more innovative integrated procurement strategies, e.g. Guaranteed Maximum Price (GMP) and Target Cost Contracting (TCC) with a pain-share/gain-share arrangement. The advantage of these approaches lie in their incentives to the contractor to be efficient and to achieve cost savings, as well as to allocate risks on an agreed basis between the client and the contractor. The GMP arrangement based on a target cost concept has been gaining popularity amongst the prospective private developers, public housing department, quasi-government mass transportation provider and major international construction contractors in Hong Kong over the past few years.

Masterman (2002) defined GMP as an agreement which will award the contractor for any savings made against the GMP and penalize him when this sum is exceeded as a result of his/her own mismanagement or negligence. Under GMP, the contractor guarantees that the project will be constructed in full accordance with the drawings and specifications and the cost to the owner will not exceed a total out-turn price. In this way a ceiling price is established, and the owner is assured that it will not be exceeded (Patterson 1999, Cantirino and Fodor 2003). However, difficulties have often been experienced in setting the ceiling price, monitoring the ceiling price as changes to the work occur, and determining the cost-sharing formula for GMP projects. Some researchers conducted research into how owners and contractors set the best cost-sharing fraction in target cost contracts in construction (Al-Subhi Al-Harbi 1998, Broome and Perry 2002). Mills (1995) advocated that a clear risk allocation between employer and contractor is essential where the contractor is expected to take the risk of default by the employer’s consultants.
Hands-on experience derived from the cases in the United Kingdom and Australia has indicated that the GMP/TCC style of procurement could bring considerable mutual benefits to all of the parties involved, provided that the risk factors are properly identified, analyzed, shared and managed (Trench 1991, Walker et al. 2000). However, the disparities in management systems, technological advances, level of construction experience and cultural background among the partners may lead to difficulties in implementing GMP/TCC projects. Hence, there is an urgent need for a more systematic and in-depth research to examine the risk aspects for delivering those GMP/TCC projects.

Significance of the project

The research is timely because more extensive use of GMP/TCC contracting will have significant impacts on design development and construction innovations introduced by contractors. Although GMP/TCC has been practised in the United Kingdom and Australia for years and numerous construction projects are employing the concept, not all these projects have been equally successful and some of the projects have been exposed to very high risks or uneven allocation of risks. Thus, it is more important to identify the Key Risk Factors (KRFs) for GMP/TCC projects and to spark a debate over whether this type of procurement should be given a place for use in Hong Kong. In addition, there is a lack of research to evaluate the levels of success and lessons learned from those GMP/TCC projects. Therefore, more systematic and comprehensive empirical case studies are needed to investigate the nature, risk exposure and risk management for implementing GMP/TCC schemes to enhance our overall understanding of the processes and issues. GMP/TCC is relatively new in Hong Kong and hence such a comprehensive study related to local conditions is significant. This research also forms a solid foundation for a comparative study of risk sharing mechanisms amongst those projects based solely in Hong Kong.

Aims and objectives

This research project aims to identify the KRFs involved and evaluate the performance of risk sharing mechanisms for GMP/TCC construction projects in Hong Kong. The objectives are to:

1. Determine the typical risk elements in implementing the GMP/TCC approach.
2. Identify the KRFs associated with GMP/TCC projects and analyze their importance.
3. Collect the opinions of project stakeholders on preferences of risk allocation in GMP/TCC projects.
4. Undertake a comparative analysis of the performance of risk sharing mechanisms amongst the GMP/TCC projects in Hong Kong.
5. Compile a set of validated guidelines for mitigating the potential risks involved and establishing better risk allocation for the implementation of GMP/TCC projects in Hong Kong.
Project status

The research work of this project is anticipated to start in March 2007 and for completion in February 2008.

Outcomes and deliverables

The proposed deliverables of this study include:

1. A list of KRFs and their relative importance in implementing the GMP/TCC approach.
2. Perceptions of experienced practitioners on nature, risk exposure, risk allocation and risk management for implementing GMP/TCC schemes.
3. Features, similarities and differences of risk sharing mechanisms performance amongst the GMP/TCC projects in Hong Kong.
4. A set of guidelines and recommendations for mitigating the potential risks involved and better risk allocation for the implementation of GMP/TCC projects in Hong Kong. The guidelines will help promote best practices and eradicate potential pitfalls.
5. Refereed publications in the form of journal articles, conference papers and research monographs for documenting and disseminating the key research findings for improvement within the construction community.

Benefits to community/government

It is indispensable for the client and the contractor to assess all the potential risks throughout the whole project life and to define clearly who is responsible for a particular risk. They have to pay considerable attention to the overall procurement process while negotiating GMP/TCC contracts to maintain a fair risk allocation between them. GMP contracts are particularly concerned with the risk of cost overruns caused by design development and late or inadequate project information (Mills 1995). Systematic risk management allows an early detection of risks and encourages the project stakeholders to identify, analyze, quantify and respond to the risks (Broome and Perry 2002), and take measures to introduce risk mitigation policies. A fundamental principle for dealing with project risks is to allocate risks associated with the implementation and delivery of services to the party best able to manage the risk in a cost-effective manner. Thus, it is valuable to the construction industry...
by carrying out a more systematic and in-depth research to examine the risk aspects for delivering those GMP/TCC projects.

This project is a continuation of an on-going research project entitled *An Investigation of Guaranteed Maximum Price (GMP) and Target Cost Contracting (TCC) Procurement Strategies in Hong Kong*, but focusing particularly on the risk aspects inherent with GMP/TCC procurement strategies in the local context, and will develop a set of guidelines for an appropriate risk allocation mechanism for future projects. The research findings are also expected to develop and test a best practice risk sharing mechanism for implementing future GMP/TCC projects in construction. The best practice mechanism will allow decision makers to have a clearer insight into risks allocation amongst the various stakeholders, especially between the client body and contracting organization at an early stage of project development, and to investigate how the risks may be overcome or mitigated.

**References**


Intra- and Inter-Project Learning and Knowledge Management in Construction Projects

Research team: Patrick S.W. Fong

Research project funded by HK PolyU Departmental Research Grant

Keywords: Project learning, knowledge management, construction industry, project-based industry

Abstract

The importance of knowledge management (KM) is intensified by the speed of change and the need for innovation in the construction industry. The greater frequency and importance of project-based working poses new challenges for the organisation’s ability to retain what it has learned or to learn from others. Project-based work poses specific problems for the capture and transfer of knowledge both across projects and (where projects are of extended duration) across project phases, because of the cyclical and discontinuous nature of the activities and their tendency to be associated with one-off, self-contained tasks. Re-inventing the wheel becomes even more difficult to avoid for project-based work, because the inherently time-bound nature of such projects involves discontinuities in personnel, behaviour and information capture. This research project aims to offer an insight into the effectiveness of different approaches to KM in the construction industry in terms of their ability to capture and transfer project-based learning. It will lead to the development of a survey instrument for the analysis of enablers and barriers to project-based knowledge management in the construction industry. This will involve identifying those variables at project levels which are likely to influence the effective capture and transfer of project-based learning. The planned outcome will also help to improve understanding of the influence of different KM practices and will provide a foundation for a more in-depth piece of research into KM practices in different sectors (e.g. public or private) with different project characteristics. The study will focus on the design phase of new construction projects across four firms in the construction sector in Hong Kong, including different varieties of projects (repetitive and non-repetitive projects) in both the public and private sectors. The anticipated benefits of the research will accrue to business at different levels, including those companies directly participating in the research as well as the wider construction community, through a variety of dissemination routes. From the validated model, a best practice guideline can be developed which will include a diagnostic tool for assessing and evaluating a project’s current practice, together with a practical ‘how to’ guide for improving the practice.

Research aims and objectives

Any study of KM practice needs to be directly related to companies’ working practices to ensure that the findings are relevant to users and engage with their concerns. This will
maximise the chances of learning being promoted, retained and shared. The proposed study thus aims to offer an insight into the effectiveness of different approaches to KM in the construction industry in terms of their ability to capture and transfer project-based learning. It will lead to the development of a propositional framework and survey instrument for the analysis of enablers and barriers to project-based KM in industries such as construction. This will involve identifying those variables (e.g. trust and openness, etc.) at project level which are likely to influence the effective capture and transfer of project-based learning. The framework will also help to improve understanding of the influence of different KM practice and will provide a foundation for a more in-depth piece of research into KM practices in different sectors (e.g. public or private) with different project characteristics.

Specifically, this study will:

1. Identify likely enablers and barriers to the effective capture and transfer of knowledge for project-based learning and thereby enhance our understanding of the KM system features needed.
2. Develop a propositional framework and survey instrument for exploration and analysis of knowledge management across construction projects.

**Project status**

This project was completed in 2005.

**Outcome and deliverables**

**Refereed journal papers and book chapters**


**Refereed conference papers**


Dynamics of Knowledge Sharing in Professional Services Organisations in Construction: Implications for Utilisation of Knowledge Management Systems

Research Team: Patrick S.W. Fong, Tong Sheenan (Arup UK) and Timothy Suen (Arup HK)

Research project funded by HK PolyU Departmental Research Grant

Keywords: Knowledge sharing, professional services organisation, construction industry, knowledge management system

Research abstract

Knowledge has become increasingly important in recent years. In response to its increased value, many organisations are implementing knowledge management systems in order to ensure that knowledge is obtained from employees and distributed throughout the organisation. This process depends on the sharing of knowledge by employees. A variety of research supports the argument that employees do not share their knowledge, and this study is concerned with why they do not fully participate in organisationally-maintained knowledge-sharing activities. Three general areas are explored to examine this topic: (1) conceptualisations of knowledge and knowledge sharing, (2) use and implementation of technology, and (3) the work environment. This research uses a qualitative method to study this topic within ARUP’s Hong Kong office, with the implication that the results can be applied to other offices globally as well. Recommendations will be made regarding strategies to enhance employees’ full participation in knowledge sharing.

Research aims and objectives

The objectives of this study are to

1. Explore how employees participate in organisationally-maintained knowledge sharing activities.
2. Identify and study social and individual aspects related to participation in knowledge sharing.
3. Determine how individuals experience knowledge management technologies.
4. Explore the relationship between the nature of the work environment and knowledge sharing.
5. Study the motivational factors that can enhance knowledge sharing.

Project status

This project will be completed in 2006.
Outcome and deliverables

Refereed journal papers and book chapters

Refereed conference papers
Market Potential for Hong Kong Professionals in the Mainland China


Research project funded by the Professional Services Development Assistance Scheme (PSDAS), Commerce, Industry and Technology Bureau, the HKSAR Government in 2003 to 2004

Project Summary

Hong Kong has an international reputation for professional services of high quality and sophistication in the areas of real estate development and construction. A key feature of this expertise is the ability to combine economic and financial principles with construction technology and project management.

With accession of China to the WTO, Hong Kong professionals in real estate and construction industries would face the prospect of increasing foreign competition in the new China market. Hence, it is important to identify: a) areas of professional services relating to real estate and urban development that exist in Hong Kong for which there is a potential market in the cities of the Mainland China; and b) the opportunities to which the development of these newly relevant professional services offer for Hong Kong professional service providers.

This research determines the demand for the Hong Kong professionals in the Mainland market through a detailed investigation between the Mainland China and Hong Kong. The investigation consists of two major components:

1. An analysis of the perceptions of Hong Kong professionals for the market opportunities and pitfalls offered in the Mainland China;

2. An analysis of the corresponding perceptions held by Mainland organizations involved in construction and real estate development of those areas where Hong Kong professional expertise would be valued.
In this research, four cities in the Mainland China, including Beijing, Shanghai, Chongqing and Guangzhou, are identified as case studies. They are all major cities with significant economic growth for years. Moreover, they are at strategic locations in the Mainland China and there is potentially high demand for construction related professional services.

In exploring opportunities in the Mainland China, it is necessary to understand the perceived market there from the perspective of Hong Kong professionals. Factors which affect the business opportunities or enhance the marketability are presented. The actual market demand among the four case-study cities are discussed. Detailed analyses in different aspects, such as the types of property development and the needs of individual cities, are demonstrated.

Lastly, a comparative study between the perceived and actual demand for the professional services in surveying, engineering and construction management is performed. With comparison of findings and analyses between the Hong Kong side and the Mainland side, it is helpful for the Hong Kong employers to better equip themselves with the knowledge and conditions of the Mainland China, as well as improve competitive power before developing opportunities.