Fourth International Conference on Construction in the 21st Century (CITC-IV)
"Accelerating Innovation in Engineering, Management and Technology"
July 11-13, 2007, Gold Coast, Australia

THE STAKEHOLDER RELATIONSHIP MEASUREMENTS OF MAJOR PROCUREMENT ROUTES IN FINLAND

Adekunle Sabitu Oyegoke

Senior Researcher, Helsinki University of Technology, Construction Economics and Management, P.O.Box 2100, 02015 HUT, Finland

Abstract

The paper presents the results of the stakeholders' relationship in major procurement routes in Finland based on empirical case-questionnaire studies. The aim of the study is to compare procurement performance in Finland based on the level of the relationship between the major players. Construction project performance is measured via rating system along design and construction stages, and among the key stakeholders of owners, consultants, contractors, and subcontractors. The procurement methods are categorized into design and build, consulting CM, contracting CM, general contract (traditional), and general Contract (separate trades). The results show that the performance attributes are shared between different routes in different phases. For instance, the consulting CM route ranked better in owner and consultant relationship in design phase due to fiduciary role of the construction manager in the projects. The design and build ranked first in relationship between the owner and the contractor in construction phases due to single point of performance responsibility. In overall relationship average rating, the consultants and contractors relationship is rated lowest in design stage while the contractors and subcontractor rated lowest in construction stage.

Keywords: Finland, management, relationship, procurement, performance

1. Introduction

Procurement strategy is an important concept as it deals with the attributes of supply chain and overall project organization set up. Cox and Ireland (2002) argue that construction supply chains remain fragmented and highly adversarial due to the conflicting nature of demand and supply. The fragmentation of a supply chain is also due to the effects of a technologically driven notion that has caused significant changes to conditions of standardization, innovation, mechanization, and prefabrication of materials, plant and labor (Cox and Ireland 2002). This results in changes in construction methods that affect the structure of the industry, the roles of the parties and the procurement methods employed.

Extensive work has been carried out on procurement methods: types and categorization, Masterman (2002), and Mohsini (1993); selection criteria, Cheung et al (2001), Love, at al (1998), Alhazmi and McCaffer (2000), and Skitmore and Mardsen (1988); comparison between some practices, Oyegoke (2001), Seleey (1999), Cox and Townsend (1998); and comparison within a practice, Dorsey (2004), Konchar & Sanvido (1998), Barrie and Paulson (1992), Poage (1990), Cornick (1991) and Haltenhoff (1999).

According to Pernu (1994) the most common procurement routes in Finland are main contracts with nominated sub-contracts, separate trades with project/construction manager and design-and–construct is

used in fewer cases. Oyegoke (2001) argues that the fixed lump sum contract which is often referred to as traditional route is common in Finnish practice. Oyegoke and Kiiras (2006) attest to the use of management routes, especially the agency and at-risks forms. In this paper 5 number of procurement routes are under consideration because of their influence in Finnish construction industry. The general contracting is divided into traditional (GC-t) and (GC-st), the later allows the inclusion of separate trade contractors in addition to GC contractor. The management route is divided into CM consulting (agency) and CM contracting (at-risk), and finally design and build (DB) route.

The project success factors are key variables that can be used to measure project performance along procurement routes. According to Munns (1995) and Chua et al (1999) total project success involves issues such as delivery on time, completion within budget, satisfaction of the owner's needs and achievement of the correct quality of work. Hatush and Skitmore (1997) lay emphasize in addition to cost, time and quality on reasonable security. The performance of a procurement route depends on many organization variables as procurement route defines project organization set-up. Love et al (1998) defines procurement as an organizational system that assigns specific responsibilities and authorities to the people and organizations, and defines the relationships of the various elements in the construction of a project.

Different measurement methods have been used to measure project performance. Konchar and Sanvido (1998) measure cost performance of a project based on total project cost/gross floor area with series of adjustment on unit cost, cost growth, and cost intensity. Yng et al (2002) use Likert scale to measure the owner's satisfaction and administrative burden. The project performance is influenced by many environmental factors due to the interactions and interrelationships of the stakeholders. According to Yng (2002) project, owners', contractors', consultants' characteristics, procurement system and other factors affect project performance.

Project performance is influenced by owners' and consultants' characteristics especially the type of the owner (Kaka and Price 1991), construction sophistication (Walker and Sidwell 1996), experience with similar projects (Walker 1994), level of staffing, as Graves (1978) linked owners' satisfaction to owner degree of control and supervision of the project. Yng et al. (2002) examine attributes that influence project performance from contractor's point of view. The contractor's and subcontractor's experience and capability, contractor's track record and management ability are said to influence project performance. They referred to the work of Samelson and Levitt (1982) and Russell et al. (1992) who attested to a potential savings of 4.5% by the owner's selection of safe contractors with impact on health and safety. The aim of this paper is to compare procurement performance in Finland based on the level of the relationship between the major players

1.2 Conduct of the Project Case Survey

The study is carried out via a literature review through theoretical analysis and empirical studies via case questionnaires. According to Donaldson (1999), qualitative and historical studies add a valuable contribution to research, while comparative and quantitative studies provide a distinct, complementary addition to knowledge. The theoretical comparison provides a basis for comparison upon which empirical studies is used for validation and comparisons.

A review of the literature on project performance and critical success factors is carried out as a theoretical background for the paper. The empirical study is carried out via a case-questionnaire to probe some recent cases of different procurement routes and to make an assessment of project performance as a whole. A self-completion case-questionnaire is used to collect both qualitative and quantitative data from experienced industry practitioners. This is to obtain both factual and attitudinal information and understanding from different players. All the investigated projects in this study are based in Finland covering both private and public projects.

The building sector in Finland was chosen as the national context for the project case survey and the subsequent interviews between June 2004 – December 2005. This is due to the author's long-term presence and the access to both local informants and project documents. In addition, the characteristics of the Finnish procurement routes are very similar to the practices within the two exemplary countries, the USA and the UK (Oyegoke and Kiiras 2006). The questionnaires are divided into six parts: the respondent's general information, the general project information, the allocation and distribution of responsibilities and risks, the project schedule in relation to tasks, their involvement in engineering design and their contractual relationships, the level of relationships between the parties and an evaluation of the project performance variables via rating system. The aim was to reveal the organizational set-ups and the involved parties' task-level performance in the project cases, ex post, along the five prevailing procurement routes (general contracting – traditional, general contracting – separate trades, CM contracting, CM consulting and design-and-build contracting) and the perceptions of the key project parties in the building sector in Finland.

The contents of responses are analyzed and authenticated through unstructured interviews. The analysis of the rating questions is done through arithmetic mean, mode, median, minimum and maximum ratings. The aim is to have a broader view of analyzing the data since a subjective-quantitative rating system is used. 3.75 out of maximum 5 rating scale are assumed to be a reasonable performance level amounting to 75% of performance level. Overall, 35 responses were eligible for the analysis as shown in table 1. In addition, 20 (39 %) respondents were interviewed via semi-structured follow-up interviews**.** The project cases were not randomly chosen as the respondent chooses her or his most recent building project.

Table1 Questionnaires distribution, the responses and the follow-up interviews.

Targeted professionals related to building projects in Finland	**No. (%)**
Total number of the questionnaires distributed	51
Total number of the responses received	42
- Number of the responses discarded	- 7
Number of the responses eligible for the analysis Share of the responses	35 (69 %)
Number of the follow-up interviews among the respondents Share of the interviewed respondents	20 (39 %)

The distribution of 35 respondents by the project party type: 9 (26 %) contractors, 8 (23 %) building designers (including 4 architects), 8 (23 %) CM/project managers, 7 (20 %) clients/owners and 3 (9 %) building product suppliers. All the respondents held the positions with high project related authority and decision-making power in their organisations. The respondents have gained the extensive experience from the exploitation of several procurement routes.

Table 2. Distribution of the projects by building size and procurement route (n = 35).

		Gross floor area (sqm)				
Route	**No.**	**< 3000**	**3001-6000**	**6001-10000**	**10001-15000**	**> 15000**
General contractor-t	8	4	2	0	2	0
General contractor-st	6	4	0	1	1	0
CM consultant	8	1	3	2	2	0
CM contractor	7	2	2	1	1	1
D-and-B contractor	6	1	2	3	0	0
Total	35	12	9	7	6	1

The range of the building types consisted of factories, parking facilities, laboratory and research buildings, multi-storey apartment buildings, industrial buildings, public buildings, one stadium and one building for handicap services. Some old buildings were renovated, refurbished and conversed (e.g. one industrial building was turned into the office building, one railway station was turned into the office building). In Table 2, the combined distribution of 35 project cases is shown by the gross floor area and the procurement route type. There are 1-4 projects in each category except in GC-st in (3001-6000), GC-t (6001-10000), D-and-B contractor (10001-15000) and all the routes in category >1500 except in CM contractor.

2 Relationship Development and Management Among Project Cases

The relationship development and management among the project parties are addressed in the case of the design phases and the construction phases, respectively. Thereafter, the levels of the relationships are compared between these principal project phases and among the five procurement routes. In Figure 1, there are no major differences in the effectiveness of the management of the relationships between the project parties during the design phases. On average, the relationships between each client/owner and the designers ranked at the level of 3.97, followed by the relationships among the designers 3.80, those between contractors and subcontractors 3.79, those between each client/owner and the contractor 3.77, as well as those between consultants and contractors 3.76.

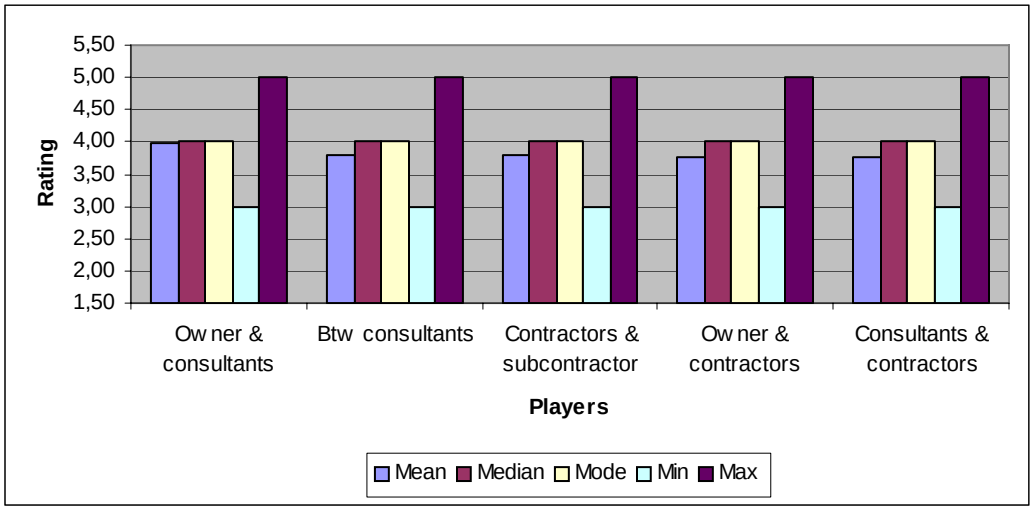

Figure 1 Relationship rating between the parties in the design phases among the projects (n = 35).

In Figure 2, there are no major differences in the effectiveness of the management of **t**he relationships between the project parties during the construction phases, perhaps with the exception of some project cases where the relationships between the client/owner and the designers as well as those between the contractor and subcontractors were rated low (with the minimum values of 2). On average, the relationships between each client/owner and contractors were ranked nearly at the level of 4.0, followed by the relationships among the designers 3.85, those between the contractor and the designers 3.84, those between each client/owner and the designers 3.79, and those between the contractor and the subcontractors 3.72.

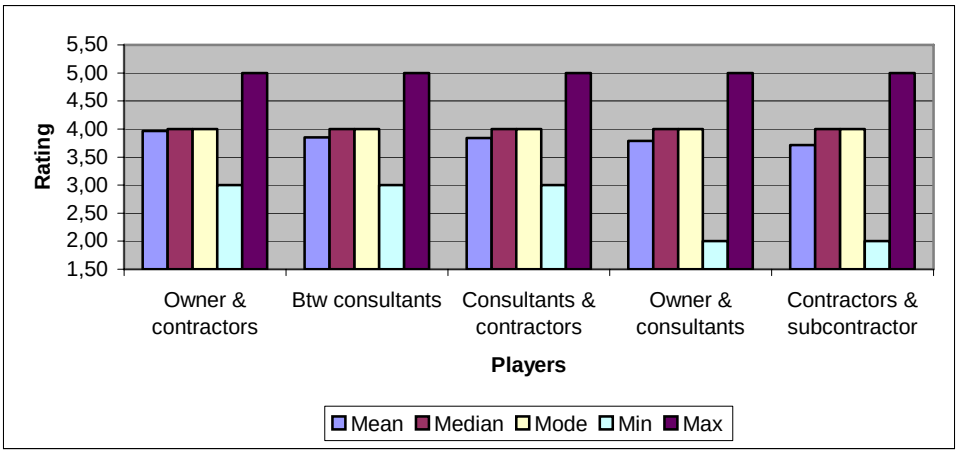

Figure 2 Relationship rating between the project parties in the construction phases among the projects (n = 35).

Table 3 Comparison of the mean relationship ratings in the design and construction phases by procurement routes among the projects (n = 35).

Procurement route	Owner and designers	Owner and contractors	Among designers	Contractor and designers	Contractors and sub-contractors	Mean
Design Phase						
CM consulting	4,29	4,00	3,83	3,86	3,50	3,90
GC-st	4,00	4,00	4,00	4,00	4,00	4,00
D-and-B	4,00	3,60	4,00	4,00	3,80	3,88
CM contract-ing	3,83	3,60	3,75	3,75	3,75	3,74
GC-t	3,75	3,67	3,57	3,20	4,00	3,64
Mean	3,97	3,77	3,83	3,76	3,81	3,83
Construction phase						
CM consulting	3,93	4,00	4,14	4,14	3,64	3,97
GC-st	3,60	4,00	3,33	3,60	3,80	3,67
D-and-B	3,60	4,20	4,00	4,10	3,80	3,94
CM contract-ing	4,00	3,86	3,86	3,83	3,71	3,85
GC-t	3,71	3,86	3,60	3,40	3,67	3,65
Mean	3,77	3,98	3,79	3,81	3,72	3,82
Design and Construction phases						
CM consulting	4,11	4,00	3,99	4,00	3,57	3,93
GC-st	3,80	4,00	3,67	3,80	3,90	3,83
D-and-B	3,80	3,90	4,00	4,05	3,80	3,91
CM contract-ing	3,92	3,73	3,81	3,79	3,73	3,79
GC-t	3,73	3,77	3,59	3,30	3,84	3,64
Combined Mean	3,87	3,88	3,81	3,79	3,77	3,82

In Table 3, the mean relationships ratings are compiled by the procurement routes and the design and construction phases. Among the five procurement routes, the combined mean ratings of design and construction phases indicate that the relationships between contractors and subcontractors is the lowest rated (3.77) while the relationship between contractor and the owners is highest rated (3.88). Along the procurement types, the CM consulting ranked best in relationship between the owner and designers (4.11) with least rating point (3.73) from GC-t route. The CM consulting equal GC-st in relationships between the owners and contractors (4.00) with the least rating point in CM-contracting. The design and build ranked better in relationship among the designers (4.00), and the contractors and designers (4.05) with lowest rating in GC-t route (3.59) and (3.30) respectively.

The GC-st route rated higher (3.90) in relationships between contractors and subcontractors with lowest rating in CM consulting route (3.57). The CM consulting route rank higher (3.93) in overall combined mean along procurement routes while GC-t route has the lowest ranking of (3.64). The traditional general contracting (GC-t) was ranked the lowest route in managing the relationships between the contractors and the designers due to the shifting of the responsibilities, the designer has not produced the design documents on time that results in further delays, the designer has acted as the client's/owner's representative with legal implications, e.g. issuing instructions and deciding on valuations, claims and variations.

In the design phases, the relationships between the client/owner and the designers under CM consulting were ranked the best at the level of 4.29. This trio's relationships were considered free of conflicts. Overall, the GC-st (4.00) ranked better than the other routes in managing the relationships through the design phases. Followed by CM consulting (3.90), D-and-B (3.88), CM contracting (3.74) and GC-t (3.64). However, there are the opposing views among the respondents. The proponents of the D-and-B contracting believed that better understanding is achieved when the designers are working on a competitive basis for the same project goal. In turn, the positive GC-st views were based on the joint obligation with the client/owner that brings about the most workable solutions. In addition, the two GC contracting routes were ranked better than the other routes in managing the relationships between the contractor and the subcontractors. This may be due to the fact that many general contractors choose the subcontractors from their long-term pools on a repeated basis.

- CM consulting is better in relation between the owner and designers (4.29), and equal GC-st in relationships between owner and contractors (4.00) with least rating in GC-t (3.75), and D-and B and CM contracting (3.60) respectively.
- The GC-st and GC-t have higher rating points in relationships between contractors and subcontractors (4.00) with least rating in CM consulting routes.
- The D-and-B route equal GC-st in relationship among the designers (4.00) and between contractors and designers (4.00) with least rating in GC-t (3.57) and (3.20) respectively.
- Along relationship variables in design phase, the owner and designers relationship has a higher mean ranking (3.97) while relationship between the contractors and designers has lowest mean ranking (3.76).
- Along the procurement route, the GC-st has the highest mean ranking (4.00) while GC-t has the lowest mean ranking (3.64).

In the construction phases, the relationships between the client/owner and the designers under the CM contracting were ranked the best at the level of 4.0 due to the CM contractor's dual role, i.e. it acts as the designer in the design phase and the main contractor in the construction phase. The D-and-B contracting was ranked best in managing the relationships between the client/owner and the contractors (4.2) as well as between the contractor and the designers (4.1). This is based on the D-and-B contractor carrying the single point of performance responsibility and coordination task. In turn, the CM consulting was ranked best in managing the relationships among the designers (4.1) and also between the contractors and the

designers based on the CM consultant's pure agency role and the direct contractual relationships and information links between the client/owner, the CM consultant, the designers and trade contractors.

- CM consulting routes rated higher in relationship among the designers (4.14), and between contractors and designers (4.14) while GC-st and GC-t have lowest ranking (3.33) and (3.40) respectively.
- CM contracting routes ranked better in relationship between owner and designers (4.00) with the equal lowest rating in GC-st and D-and-B routes (3.60).
- In relationships between owner and contractors the D-and-B route ranked higher (4.20) with equal least ranking in CM contracting and GC-t (3.86).
- The GC-st and D-and-B routes ranked higher (3.80) in relationship between contractors and subcontractors with lowest ranking in CM consulting.
- Along relationships variables the relationships between owner and contractors has higher ranking (3.98) with the lowest ranking in relationships between contractors and subcontractors (3.72).
- Along the procurement routes, the CM consulting route has better mean rating (3.97) while GC-t has lowest mean rating (3.65).

3 Conclusions

There are no two-project cases that were executed in the same way even along the same procurement route. This indicates both real complexity and difficulties in categorizing real projects along the procurement routes. Nevertheless, the comparison of five procurement routes in terms of the surveyed aspects of 35 project cases reveals some merits and demerits of each prevailing route. The overall mean in design phase indicates that the GC-st ranked better followed by CM consulting, D and B, CM contracting and GC-t. The overriding issues that determine the success of procurement route in design phase is the nature of contractual relationship between the stakeholders. The more the fiduciary role the better is the relationship in design phase, e.g. the overall mean relationship between the stakeholders indicate that owner and designer ranked better followed by relationship among consultants with the owner. The trend in construction phase shows a mixture of factors as the overall mean support CM consulting as better route followed by D and B, CM contracting, GC-st and GC-t. Also, the trend shows that the relationship between owner and contractors ranked first followed by that of contractors and designers, among designers, owner and designers, and contractor and subcontractor. The overall trend of the combination of the design and construction show a number of factors: direct contractual relationship, value engineering and design management, expert knowledge input, flexibility, competition, risk allocation and responsibility distribution, level of performance responsibility, owner's knowledge, competition methods employed among others. The combination of these factors from integrated and fragmented spectrum of procurement route is a potential solution for a better procurement route.

References

Alhazmi, T. and McCaffer, R. (2000) Project procurement system selection model, Journal of Construction Engineering and management, Vol. 126, No. 3, 176-184.
Barrie. D.S. and Paulson, B.C. (1992) Professional construction management. McGraw-Hill.
Cheung, S., Lam, T., and Leung, M. (2001) An analytical process based procurement selection method. Construction Management and Economics, Vol. 19, 427-437.
Chua D.K, Kog, Y.C. and Loh, P.K. (1999) Critical success factors for different project objectives. Journal of Construction Engineering and Management, May/June.
Cornick, T. (1991) Royal Institution of Chartered Surveyor Investment Procurement and Performance in Construction. E & FN SPON.

Cox, A and Ireland, P. (2002) Managing construction supply chains: the common sense approach. Engineering Construction and Architectural Management, Vol. 9, Nos. 5/6, 409-418.
Cox, A., and Townsend (1998) Strategic procurement in construction. Redwood Books.
Donaldson, L. (1988) In defense of organization theory. A reply to critics. Cambridge University Press.
Dorsey, R.W. (2004) Project delivery systems for building construction. 2nd edition. Associated General Contractors of America.
Graves, F. (1978) Construction for an industrial recovery, National Economic Development Office, Steering Group on Industrial Building and Infrastructure, HMSO, London
Haltenhoff, C.E. (1999) The CM contracting system; Fundamentals and Practices. Prentice-Hall.
Hatush, Z. and Skitmore, M. (1997) Criteria for contractor selection, Construction Management and Economics, 15, 19-38
Kaka, A. and Price, A.D.F. (1991) Relationship between value and duration of construction projects, Construction Management and Economics, 12(1), 112-120
Konchar, M. and Sanvido, V. (1998) Comparison of US project delivery systems. Journal of Construction Engineering and Management, Vol. 124, No. 6. pp.435-444
Love, P.E.D., Skitmore, M. and Earl, G. (1998) Selecting a suitable procurement method for a building project. Construction Management and Economics, Vol. 16, 221-222.
Mohsini, R.A. (1993) Knowledge-based design of project-procurement process. Journal of Computing in Civil Engineering, Vol. 7, No. 1, 107-122.
Munns, A.K. (1995) Potential influence of trust on successful completion of a project, International Journal of Project Management 13(1), 19-24
Oyegoke, A.S. (2001) UK and US Construction management contracting procedures and practices: a comparative study. Journal of Construction Engineering and Architectural Management, Vol. 8, Nos. 5/6, 403-417.
Oyegoke, A.S. and Kiiras, J. (2006) Two generic perspectives of CM contracting systems: a case of the US, the UK and Finland, Journal of Construction Procurement 2006 vol. 10, (2), (in print)
Pernu, P. (2000) Procurement, contracting and competition in building construction, CEM/HUT report 125.
Poage, W.S. (1990) The building professional's guide to contract documents. RSMeans CMDGROUP.
Russell, J.S., Hancher, D.E., and Skibniewski, M.J. (1992) Contractor prequalification data for construction owners, Construction Management and Economics, 10, 117-135
Samelson, N.M. and Levitt, R.E. (1982) Owner's guidelines for selecting safe contractors, Journal of the Construction Division, ASCE, 108(C04), 617-623
Seeley, I.H. (1997) Quantity surveying practice and contracting procedure. 2nd edition. Macmillan Press.
Skitmore, R.M. and Mardsen, D.E. (1988) Which procurement system? Towards a universal procurement selection technique. Construction Management and Economics, Vol. 6, 71-89.
Walker, D.H.T. (1994) Procurement systems and construction time performance, proceedings of CIB W-92 International Procurement Symposium, W92 East meets West, Department of Surveying, University of Hong Kong, 4-7 December. p. 343
Walker, D.H.T and Sidwell, A.C. (1996) Benchmarking engineering and construction: a manual for benchmarking engineering construction time performance. Construction Industry Institute Australia, University of South Australia, Adelaide, Australia
Yng, F.L.Y., Lean, C.S., Wai, E.C.C., Ping, E.L., Min, L. (2002) Performance evaluation of alternative project procurement methods, project report, National University of Singapore