

STRUCTURE OF THE PUBLIC PRIVATE PARTNERSHIP/PRIVATE FINANCE INITIATIVE MARKET IN THE UK CONSTRUCTION INDUSTRY

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Public Private Partnership/Private Finance Initiative (PPP/PFI) market has become popular for the public sector service delivery after a decade of its introduction into the UK construction industry. Its position in the industry is well rooted and substantial in size, yet the structure, nature of competition and the market orientations are little-known. This paper analyses the current PPP/PFI market structure in the UK construction industry especially its market concentration using concentration ratio method, a widely used industrial organization tool in analyzing market competitions. The capital values of all PPP/PFI projects, which involved construction activities, were used to analyse the market concentration; and the market leaders have been identified; competition among them and the top markets have been investigated. The result shows the nature of competition within the PPP/PFI market hugely differs within the sub-sectors (health, education, etc) but almost all of them fall into medium concentration or Oligopoly except education sector where competition among the firms is fierce. Top firms have their own speciality markets but most competition is within the top three sub-sectors; transport, health and education.

Keywords: competition, concentration ratio, market structure, PPP/PFI.

INTRODUCTION

After more than a decade since its first introduction, Public Private Partnership /Private Finance Initiative (PPP/PFI) market has now become a significant mean for the delivery of public sector services within the UK construction industry. The number of financial closed projects reached over 750 and worth more than £ 46 Billion at the end of 2006, according to Partnerships UK (a private public partnership entity between private firms and HM Treasury) database (PUK Database, 2006). Major activities within the projects vary from construction, facility management, medical, and business development to software/IT upgrades and trainings. Among these, more than 66% of PPP/PFI projects that reached financial close by 2005 involved construction and/or property activities. It is reckoned that this has had significant influence on the UK construction industry in terms of its structure, conduct and performance.

Value for money, risks management, and performance of PPP/PFI projects have been explored widely (Robinson *et al.*, 2004; House of Common, 2001, HM Treasury 2003) yet its influence on the organization of the industry has remained uninvestigated. The market structure of PPP/PFI within the construction industry is imperative but there are little empirical reports on this. Using the data collected from

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Partnerships UK (PUK) database and the UK Department of Trade and Industry (DTI) until May 2005, the paper presents analysis of the market structure of the PPP/PFI market within the construction industry using Concentration Ratio (CR) method, a widely used industrial organization tool in analysing market concentration, competition types and the market structure (Scherer and Ross, 1990). Data used in the analysis of the UK PPP/PFI market in the construction industry and its market concentration are from PPP/PFI projects with facility management, construction and/or property activities. (Projects which focus on IT, business process re-engineering, trainings and other non-construction activities are filtered out.) Table shows that 47.8% of the UK PPP/PFI projects by value (or 65.45% by number of projects) fall within this category.

Table 1: Percentage of Construction work until May 2005

	£ M	Percentage
Value of PFI projects which includes construction	£ 20.47 billion out of £42.8 billion	47.8 %
Number of projects which includes construction	432 Projects out of 660 Projects	65.45%

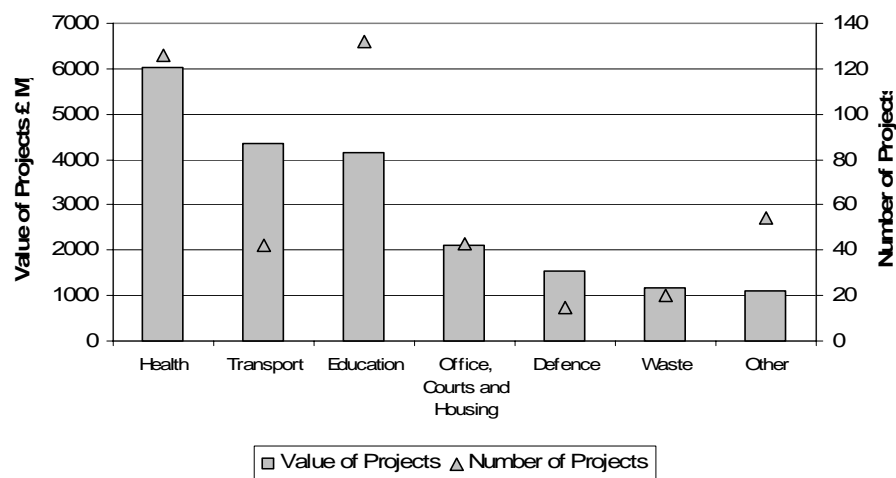
(Source: PUK database, 2005)

PPP/PFI SCHEMES WITHIN THE UK PUBLIC SECTOR PROJECTS: FACTS AND FIGURES

PPP/PFI is widely used across all UK public sector projects. The PPP/PFI market can be categorized into sub-markets such as Health, Transport, Education, Defence, Waste and Office/Courts/Housing sectors. Prison, Detention Centres, Libraries, Leisure Centres, and Emergency Services are categorized into “Other” sector in the analysis. Dominant major public sectors in the market are Health, Transport, Education, and Defence sectors as shown in Table 2, where they are responsible for 29.52%, 21.22%, 20.32% and 7.51% of the total value of the projects respectively. If the extremely high valued underground PPP/PFI projects are excluded from transport sector, in order to prevent the skewness of the analysis, health sector is the highest valued UK public PPP/PFI sectors with 126 projects worth £6.04 billion until May 2005. Excluding Underground PPP/PFI projects, transport sector is in second place with 42 projects worth £4.34 billion capital value. Education sector counts £4.16 billion from 132 numbers of construction related PPP/PFI projects, and is standing as third biggest public PFI sector. In fourth position are less complex projects involving office, courts and housing projects with projects value of £2.1 billion from 43 construction projects. Although the numbers of defence sector projects are not many, they are bigger valued projects accounting for £1.537 billion from 15 PPP/PFI construction projects. Waste sector accounts for £1.186 billion from 20 projects and other projects such as Prisons and Detention Centres, Emergency services and Library etc account for £1.054 billion from 54 projects. The current sectorial landscape of PPP/PFI projects across UK public sectors is also depicted by Table 2 and Figure 1.

Table 2: Number and Value of Construction PPP/PFI Projects across UK Public Sector in Ranks (*Transport exclude Underground projects*)

No	Sector	Number of Projects	Value of Projects (£M)	% of Total Value
1	Health	126	6043.14	29.52
2	Transport	42	4344.00	21.22
3	Education	132	4160.51	20.32
4	Office, Courts and Housing	43	2104.01	10.28
5	Defence	15	1537.55	7.51
6	Waste	20	1186.54	5.80
7	Other	54	1095.59	5.35
Total		432	20471.34	100

**Figure 1:** Number and value of PPP/PFI projects across UK Public sectors (*Transport exclude Underground projects*)

MARKER STRUCTURE, MARKET CONCENTRATION AND CONCENTRATION RATIO

In order to analyse the market structure, knowing the market concentration within the analysed market is imperative. Market concentration is determined by the market share of the firms within the specific market. It is the portion of the market's total sales accounted for by one or more firms in the particular sector (Bain 1956; Lipczynski, 2001). An individual firm is often concerned with its "share of the market" as an indication of "success" (Scherer and Ross, 1990). Market share is a key to the analysis of market structure, market control, and sector concentration. It can be used to indicate the degree of concentration and market control of one or more firms in an industry. The market concentration can be determined in two main ways; by "Concentration Ratio" or by the "Herfindahl-Hirschman Index (HHI)" (Scherer and Ross, 1990). Concentration Ratio uses the functions of all the individual firms' market shares as of top four firms (CR4) or eight firms ratio (CR8). The Herfindahl-Hirschman Index (HHI) is the sum of the squares of the percentage market shares of the firms in a market (Scherer and Ross, 1990). United State Department of Justice used the four-firm concentration to determine market competitions within its industries (USDOJ, 1996).

Concentration Ratio (CR) method is used in the study that formed the basis for this paper to determine the UK PPP/PFI public sector market concentration. CR method is the most used way of calculating the market share held by particular firms in the market (Scherer and Ross, 1990). It is the percentage of total market sales accounted for by a given number of leading firms. The four-firm concentration ratio is the total market share of the top four firms with the largest market sales; eight-firm ratio is the total of eight top firms'. Four-firm concentration ratio is used in this study to describe the general structure of the PPP/PFI market. Table 3 depict the categorization of CR4s and their corresponding market competitions.

Table 3: Concentration ratios (CR) and their level of concentration

Level	Four-firm CR
No Concentration (Perfect Competition)	CR nearly Zero
Low Concentration (Monopolistic Competition)	CR < 40 %
Medium Concentration (Oligopoly)	40 % < CR < 80 %
High Concentration (Monopoly)	CR > 80 %

However, the competition between the market sectors cannot be described comprehensively by concentration alone. Numbers of projects, sizes of the projects, collaboration within the market players and types of the activities that the firms in the market engage are also important to describe competition between market sectors. The concentration of the market alone merely shows the general competition level within the sectors (Faulkner and Campbell 2003). It needs more closed up look into the sectors to know the competition and the structure. However, this paper mainly discusses the most important indicator of market structure, i.e., the market concentration, using the concentration ratio method.

CR 4 is given by the equation,

$$CR4 = \sum_{i=1}^4 s_i \tag{Equation 1}$$

where $S_1 > S_2 > S_3 > S_4$ are the market shares of the largest four firms. It is a positive index of concentration, with values closer to unity indicating higher concentration (McCloughan, 2004).

CONCENTRATION AND COMPETITION WITHIN THE UK PUBLIC SECTORS

Using collected data within the sub sectors, the market concentration has been calculated using Equation 1. The results are shown in Figure . The Figure show that the most concentrated public PPP/PFI sector is defence sector (CR4 being 0.67), followed by Office/Court/Housing and Health sector. The Defence sector is categorized as medium concentration or Oligopoly given its CR4 (0.67). The reason Defence sector being most concentrated is partly because Defence sector has limited numbers of PPP/PFI projects, and these projects are mostly big in size, attracting less number of contracting firms compared with other sectors. Thus, the PPP/PFI projects in the Defence sector are contracted by small numbers of construction firms in contrast to other sectors such as Education. That the number of contractors involved in defence projects is small is not surprising given the specialized nature of defence projects and the need to maintain security within the projects. Collaboration of construction firms in defence sector PPP/PFI project is less prominent compared to

other sectors. The defence sector construction projects are dominated by high valued projects such as MoD main building refurbishment project and Colchester Garrison projects, with a combined project cost of £884 million. Only the MoD main building project attracted three big contractors (Skanska, Laing and Amey). The rest of the MOD projects involve mostly one construction firm in the consortium.

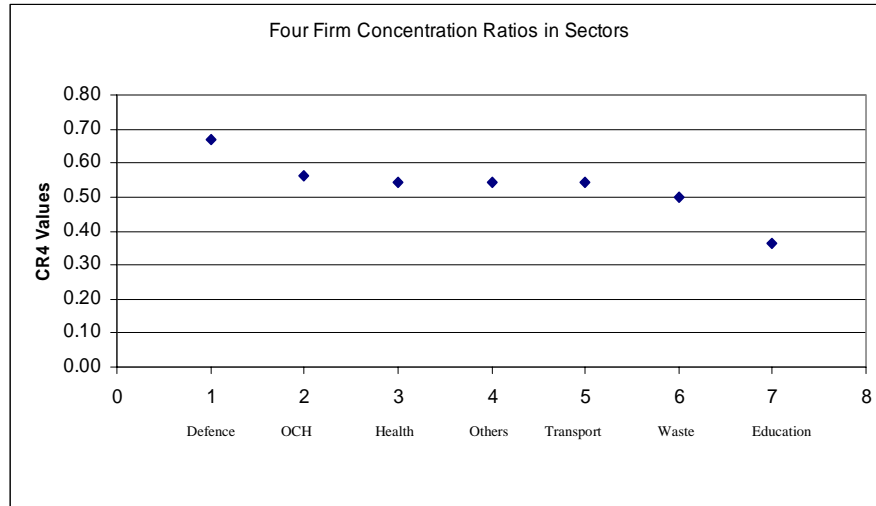


Figure 2: Four-firm concentration ratios (CR4) within UK PPP/PFI sub-sectors

Office, Courts and Housing sector (OCH) is also a medium concentrated market sector with concentration ratio 0.56 with the market competition led by Carillion, Mowlem, Bouygues, and Bovis that are responsible for 44 % of market share. Mowlem competes in this market with its FM firm Aqumen. Indeed, the market in this sector is dominated by Carillion's £ 452 million GCHQ New Accommodation Project. Carillion's involvement in this project is as 40 % share holder as well as Design Build contractor and hard and soft FM contractor. The size of this project and Carillion's involvement has made the sector quite concentrated compared to other sectors.

Health sector comes third with CR 4 value at 0.54. The market is also recognized as medium concentration or Oligopoly. Health sector has largest construction PPP/PFI projects capital investment, Table 2. Competition between the firms within this sector is fairly good even though the top four firms are responsible for 54 % of the market. There are many construction firms working in the sector, in contrast to the Defence sector, suggesting that competition within the market is fragmented compared to other sectors. However, collaboration in this sector among construction firms is less than that of transport sector.

Another sector with medium concentration is the "Other" sector, which represents Prisons and Detention Centres, Libraries, Emergency Services PPP/PFI projects with CR4 being 0.54. It is a diverse sector given the participation of many and different types of construction firms in the PPP/PFI projects within the sector. Apart from top four firms taking 46 % market shares, there are many smaller players that are involved in the market.

Transport sector is another medium concentrated Oligopoly market sector (CR4 = 0.54). Although the concentration in this sector is the similar to Health and "Other" sectors with CR of 0.54, the nature of the competition within this sector totally differs for many reasons. Firstly, many of the transport projects are big in size and the number of small projects in the market is limited. Secondly, more collaboration

between construction firms can be seen in the sector, for instance, four big firms are involved in £485 million Birmingham Northern Relief Road (M6 Toll) PPP/PFI project. Thirdly, yearly concentration in transport sector PPP/PFI projects is different and fluctuating. This can be explained by a number of large transport PFI projects that reached financial close in 1996 and 2003. These differences are noticeable despite that the underground projects are excluded from the analysis.

Waste sector's concentration ratio is 0.50. The sector is similar to transport sector in having bigger projects, but with much fewer number of projects in the sector. Only 20 projects valued at worth £1186 million are involved. Even though the top key players in the market, namely Balfour, Amec and Laing are involved in waste projects, the sector has many firms that are involved in the delivery of the public sector waste infrastructure doing construction works. None construction firms (e.g. Shanks Group) are involved in the market and they depend on small sub contracting firms for their waste infrastructure construction. In addition there are many other non-construction firms in the sector that are responsible for building waste management plants. The competition within the sector is not between big construction firms but rather between non-construction firms and construction firms.

The only sector which is not concentrated at all is the Education (CR value = 0.36) with the PPP/PFI projects spread among many construction firms. The top four firms (Jarvis, Carillion, Balfour Beatty and Mowlem) are responsible for only 36 % of the market share, making the sector low concentration. An important factor that has contributed to this scenario is the number of projects in this market; there are 132 projects in the sector (the highest number of projects of all the UK PPP market sectors). Since the competition within the market sector is high, the number and size distribution of projects within the sector is very diverse. For example, while Jarvis has 23 projects with a combined capital value of £568 million, Carillion has 4 projects with a combined capital value of £360.5 million. Similarly, Balfour Beatty and Mowlem have approximately £300 million capital value projects each from 7 and 5 projects respectively. The rest of the market is distributed among many construction firms. This suggests that the market structure for education PPP/PFI project is very different from the other sectors nonetheless that the sector is ranked third in terms of its PPP/PFI projects capital investment (Table 2) and is indicative of the high competitiveness of education PPP/PFI projects. Compared to Health, Transport, and Defence projects, Education projects are less complex in terms of design, construction and maintenance; this could be a reason why many construction firms are prepared to have a stake in the market. In addition, education PPP/PFI projects offer the public sector an opportunity to bundle many schools together to produce a PPP/PFI project. This is very attractive to construction firms who may be looking for large size PPP/PFI projects to absorb huge overhead costs (including bidding costs) of PPP/PFI projects.

YEARLY MARKET CONCENTRATION TREND

Figure 3 shows the yearly number and the value of PPP/PFI projects from 1995 to 2004 while Figure 4 shows the yearly market concentration trend. The Figure shows that the concentration of PPP/PFI market is reducing yearly indicating construction firms have adapted to the market well and competition is getting higher after gaining experiences dealing with PPP/PFI projects. The PPP/PFI market in the construction industry is unique in comparison to other markets in terms of projects nature and size. The size of the projects involved varies hugely, and in some years, very few big size

projects out-weighed many small size projects with consequential effects of high concentration in that years. In some years, some sectors have no significant projects or financial close.

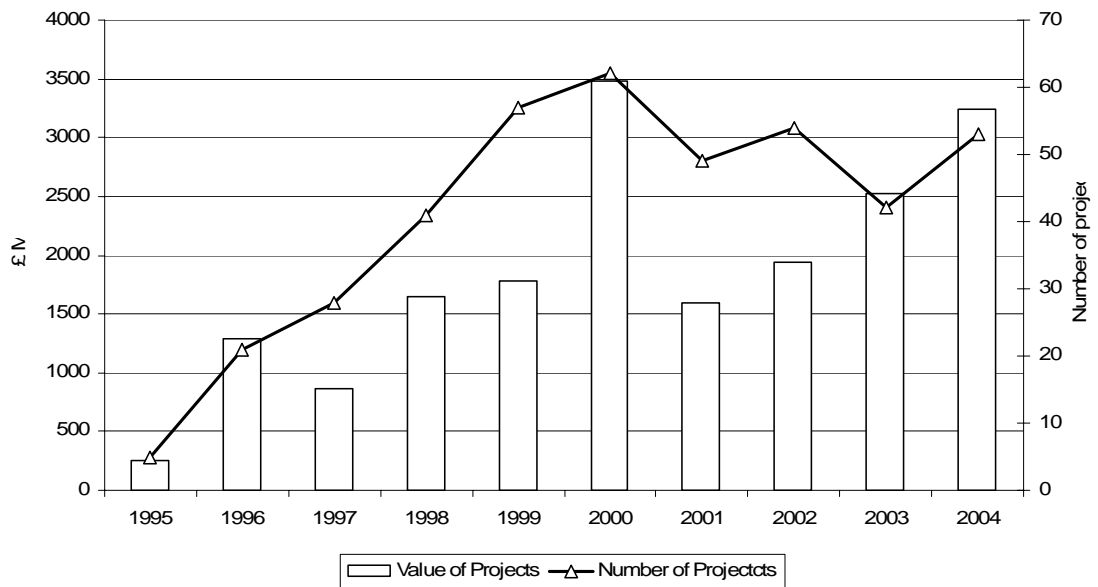


Figure 3: Number and Value of Construction PPP/PFI projects from 1995 to 2004

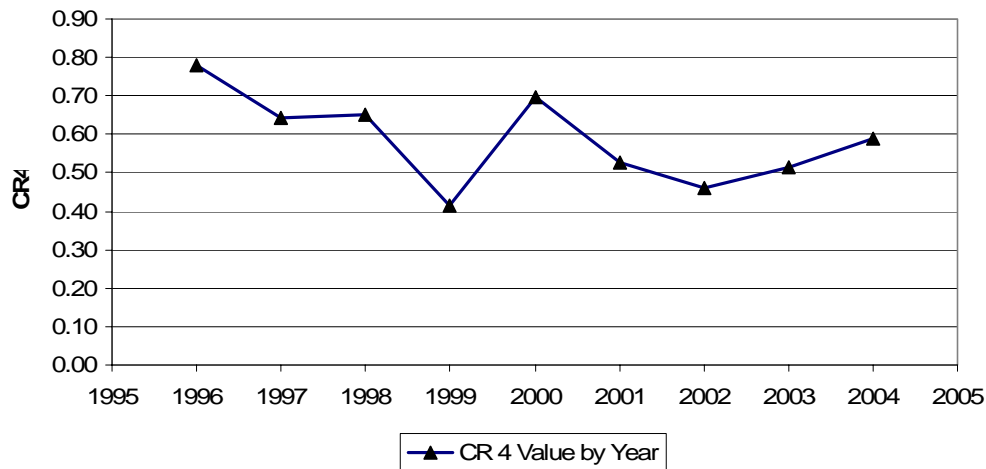


Figure 4: Yearly market concentration trend

CONCLUSION

PPP/PFI procurement route has now become a significant mean for the delivery of public sector services within the UK construction industry. Its position in the industry is well recognized and the market is substantial in size, yet the structure, nature of competition and the market orientations are little-known. Thus, the current PPP/PFI market structure in the UK construction industry especially its market concentration is investigated. The capital values of all PPP/PFI projects, which involved construction activities, were used and the market leaders have been identified; competition among them and the top markets have been investigated.

Almost all sub-sectors within the UK PPP/PFI construction market are what can be considered medium concentration or Oligopoly market except the education sector

that is highly competitive. Education sector can be ranked a low concentration sector. Each sub-sector in the UK PPP/PFI market has its own unique nature of market orientation, competition behaviour and client side requirements. However, at this stage, there is a need to explore more into each sector in order to produce a more refined picture of competition nature of PPP/PFI sectorial market. This will enable the market shares of construction firms that are involved in PPP/PFI projects as well as type of activities they are involved to be articulated.

A major limitation of the research that formed the basis for this paper is lack of complete information on the proportion of work undertaken by each construction firm in a PPP/PFI project consortium. Thus, in some projects, where two or more contractors are associated with the same project investments, some adjustments have been made for the contracting firms' project value. For instance, if a project is contracted by two construction firm and if there is no exact data on their complete share of the value, the capital value has been divided by 2 to ensure that the capital value distributed to both firms. This has had some effect on the results of analysis presented in the paper.

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