Routledge
Taylor & Francis Group

Construction Management and Economics

ISSN: 0144-6193 (Print) 1466-433X (Online) Journal homepage: https://www.tandfonline.com/loi/rcme20

Predicting construction firm performance: an empirical assessment of the differential impact between industry- and firm-specific factors

Florence T. T. Phua

To cite this article: Florence T. T. Phua (2006) Predicting construction firm performance: an empirical assessment of the differential impact between industry- and firm-specific factors, Construction Management and Economics, 24:3, 309-320, DOI: 10.1080/01446190500435127

To link to this article: https://doi.org/10.1080/01446190500435127

Construction Management and Economics (March 2006) **24,** 309–320

Predicting construction firm performance: an empirical assessment of the differential impact between industry- and firm-specific factors

FLORENCE T. T. PHUA*

Faculty of the Built Environment, University of New South Wales, 2052, Sydney, NSW, Australia

Received 11 February 2005; accepted 6 October 2005

It is obvious that the performance of firms hinges upon the dynamics of both industry- and firm-specific factors. A less obvious, and perhaps a more important, line of inquiry is that to the extent that they have a bearing on firm performance, how much do these two groups of factors respectively predict firm performance? To date, performance differences among construction firms that stem from industry- and firm-specific differential effect has remained largely unexplored. Using a dataset comprising 526 firms across various construction-related sectors, the sector-by-sector firm performance variation that is attributable to the heterogeneity of both industry- and firm-specific characteristics was empirically examined. That statistically significant results of different effect sizes are found indicates that although these factors are often assumed to be intertwined it is possible to study their respective impact on firm performance. Future studies could usefully replicate and extend this study to construction firms in other countries to further investigate what drives firm performance under different national, industry and firm contexts.

Keywords: Firm performance, performance heterogeneity, industry-specific factors, firm-specific factors, institutional environment, resource-based view

Introduction

The amount of construction management literature suggesting that the inter-relatedness between industry- and firm-specific factors exerts a direct impact on overall firm performance is not insubstantial (e.g. Bresnen, 1990; Hillebrandt and Cannon, 1990; Pries and Janszen, 1995; Arditi *et al.*, 2000; Stumpf, 2000; Naoum, 2001). That such inter-relatedness is complex and dynamic and, hence, difficult for construction researchers to assess empirically (Walker, 2002) has either directly or indirectly led many to adhere to the view which does not go beyond recognizing that a link exists between these factors and firm performance. However, quite what factors and how much impact they respectively have on firm performance remains largely unconsidered. The scant empirical attention devoted to investigating the performance determinants at the firm level is in stark contrast to the heavy focus given to the investigation of the performance determinants at the project level (e.g. Pinto and Sleven, 1988a, 1988b; Chua *et al.*, 1999; Shenhar *et al.*, 2001, 2002; Chan *et al.*, 2004; Phua, 2004). A possible reasoning for this imbalance is due perhaps to, firstly, the lack of consensus on how firm performance should be measured, and secondly, the relatively weak theoretical conceptualization and objective operationalization at the firm level of the predictors of firm performance. Although this conjecture appears to be true in the field of construction management, the same cannot be said about mainstream management and business strategy literature, for this an area of research that has made significant and rigorous theoretical and empirical advances in the last 20 years or so (e.g. Barney *et al.*, 2001; Hawawini *et al.*, 2003; Hoopes *et al.*, 2003). Grounded in this extensive body of work, this paper argues that identifying the factors that drive construction firm performance and assessing the extent of empirical association between them and firm performance is critical because these bear a direct relevance to what firms in responding to the environment do, in

* E-mail: f.phua@unsw.edu.au

Construction Management and Economics
ISSN 0144-6193 print/ISSN 1466-433X online © 2006 Taylor & Francis
http://www.tandf.co.uk/journals
DOI: 10.1080/01446190500435127

terms of prioritizing, organizing, structuring and procuring their resources to generate economic rents and achieve sustainable competitive advantage (Lippman and Rumelt, 1982; Schmalensee, 1985; Barney, 1986; Hansen and Wernerfelt, 1989; Rumelt, 1991; Peteraf, 1993). The questions of how 'firms obtain sustained competitive advantages by implementing strategies that exploit their internal strengths, through responding to environmental opportunities, while neutralizing external threats and avoiding internal weaknesses' (Barney, 1991, p. 99) have dominated much of the strategy literature. Without exception, as the construction industry worldwide is increasingly becoming more competitive (Proverbs and Faniran, 2001), and particularly for a developing academic discipline like construction management, understanding the sources of construction firm performance and, hence, firms' ability to derive sustainable economic profit would seem to be a warranted requirement.

While a few isolated studies have looked specifically at factors that lead to firm failures in the construction industry (Arditi et al., 2000; Hall, 1994; Kangari, 1988; Langford *et al.*, 1993; Kale and Arditi, 1998), no attempt in terms of investigating the factors that predict firm performance has been made. In attempting to bridge this gap in the literature, this paper is organized in three parts: first, to introduce a well-established framework that incorporates resource-based and institutional perspectives for identifying the pertinent industry- and firm-specific factors that affect construction firm performance; second, to analyse and test empirically on a sector-by-sector basis the differential effects that these factors may have on firm performance; and third, to discuss the implications of the results for research and more generally, for practice.

Review of the literature

According to the resource-based view, it is each firm's specific accumulation of resources and capabilities that distinguish how well firms perform in relation to one another, which in the longer run leads to performance heterogeneity within the market (Wernerfelt, 1984; Peteraf, 1993; Yeoh and Roth, 1999). In other words, the ability of firms to achieve superior economic and strategic performance is a function of what firms do in terms of acquiring, exploiting, managing and deploying their unique resources and capabilities. More specifically, these resources and capabilities must be valuable, rare and difficult to imitate and substitute (Barney, 1991). That these valuable, rare and non-substitutable resources and strategic assets are derived from a firm-specific context suggests that they can both be: (i) tangible, such as economic factors of production (e.g. land, materials, labour, capital), licence, market share, patents, and (ii) intangible, such as human capital, prestige, firm experience, management system, reputation, technological know-how, and buyer-supplier relationships.

However, insofar as firms can rationally and strategically acquire and deploy their firm-specific resources, these activities are to a larger or lesser degree underpinned by broader industry circumstances that exist due to specific regulatory institutions (e.g. laws, regulations) and, normative and social institutions (e.g. professional conformity and societal expectations). The contexts in which resource decisions are made are affected by pressures of firms seeking social conformity, and compliance with rules, regulations and norms which, in turn dictate what are regarded as legitimate economic endeavours. The compliance with regulations and norms is deemed important because firms that conform 'are rewarded. … through increased legitimacy, resources, and survival capabilities' (Scott, 1987, p. 498). Hence, the emphasis is placed on the role that institutional factors play in influencing the potential of firms to earn economic rents such that 'successful firms are those that gain support and legitimacy by conforming' (Oliver, 1997a, p. 698). Considered in conjunction with the resource-based view, this line of reasoning provides a richer insight than what resource-based view alone can offer (DiMaggio and Powell, 1983; Scott, 1987, 1995; Lawrence *et al.*, 2002) since institutional pressures for compliance with and adherence to certain regulatory policies or legislation shape and constrain the extent to which firms are free to perform their key business activities (Granovetter, 1985).

The construction industry like all other industries possesses certain such industry-specific characteristics (Cherns and Bryant, 1984) that impinge on the core business activities of firms and guide the kinds of decisions that firms make. This suggests the endowment of unique resources of firms coupled with the existence of certain rules, regulations and norms that are present within the industry determine the kinds of strategies that firms pursue to achieve optimal economic performance. For instance, the industry's regulatory institution on occupational health and safety influences the way firms organize and manage their workforce/labour and deploy other critical resources because non-compliance will lead to some form of regulatory sanctions. On the other hand, normative institution refers to the procedural and ethical requirements imposed by various trade, accreditation and professional bodies to induce across-the-board conformity and legitimacy. Instances of this would be ISO 9001 quality assurance and safety standards

accreditation, or the chartered architects and surveyors professional accreditation. Similarly, it can be reasonably conjectured that some construction firms operating mainly in the private sector or the public sector of the industry are respectively governed by different regulations, mechanisms and procedures, and hence would mean these firms employing different strategies to mobilize their core economic resources to achieve sustained performance.

That 'firms seek both economic and social fitness' (Oliver, 1996 p. 172) in order to obtain improved performance (profitability) by (i) exercising prudence and astuteness in maximizing the potential of firm-specific resources, and (ii) complying with industry-specific institutional forces, raises two important questions. First, what is the respective impact of industry- and firm-specific factors on construction firm performance? Second, as the construction industry is made up of distinct sectors (e.g. architects, contractors, engineers), do industry- and firm-specific effects vary across these sectors? These are legitimate questions to address because unless the differential effects (if any) of these factors on firm performance are understood, the assumption remains that these intertwined factors have the same relevance on all industry sectors. The implication of this assumption is twofold: (i) for research – it obscures the need to discern the impact of potentially critical determinants of firm performance and hence, compromise the rigour of research – and (ii) for practice – it perpetuates the notion that the impact of these factors on firm performance cannot be empirically quantified, resulting in the constraints and opportunities created by the institutional environment with respect to the way firms manage their resources being poorly understood.

Present study and hypotheses development

Consistent with the forgoing argument indicating it is no longer feasible to 'assume that technical (task) considerations are independent of institutional arrangements' because 'all exchange processes take place in markets that are themselves socially constructed' (Scott, 1988, p. 137), then the logical impetus would be to test the respective and unique predictive power of institutional and resource-based factors on construction firm performance. Results will provide an indication of the relative roles that industry *vis-à-vis* firm-specific factors play in determining performance for the construction industry as a whole as well as for its various industry sectors.

The construction industry is an excellent industry specimen for this study not so much because this is an area of research that has not been dealt with properly before, but rather because the industry has always been affected by strong institutional, regulatory frameworks and normative traditions. For instance, it has been suggested that on average, up to a quarter of the final cost of a typical building project is attributable to compliance with various institutional demands and regulations (Oliver, 1997b).[1] At the same time, it is also true to suggest that the construction industry – because of its underlying structural characteristics and methods of operation – is highly competitive (Walker, 2002) and such competitive pressures drive firms to capitalize and make the most of their unique resources and capabilities. Hence, one would expect both industry- and firm-specific factors to play vital roles in affecting construction firm performance. A prime example of the interrelatedness between institutional and resource-based relationships on construction firm performance, stems from increased opportunities to compete for certain government contracts and possibly, increased capital investments from clients due to firms' adoption of cutting-edge construction processes that are environmentally friendly (*The Economist*, 2004). The ability to attract investment dollars provides firms with incentives to improve the construction delivery systems through innovative R&D activities, which in turn is a source of economic profitability and/or competitive advantage. And so, the following hypotheses can be advanced:

> Hypothesis 1: Factors pertaining to industry-specific institutional environment will positively predict construction firm performance.

> Hypothesis 2: Factors pertaining to firm-specific resource-based environment will positively predict construction firm performance.

Following from this, it is argued that as the construction industry comprises various distinct sectors, each with its (albeit slightly) different institutional environment will result in possibly diverge ways in which firms manage and utilize their firm-specific resources. The next hypothesis is as follows:

> Hypothesis 3: The influence of both industry-specific institutional and firm-specific resource-based factors on firm performance will vary across different sectors of firms within the industry.

It is further proposed that because firms differ in the ways in which they respond and react to business circumstances, it is possible to gauge the differential effects of these factors on construction firm performance by examining how much importance and relevance do firms attach different institutional and resource-based circumstances/factors to firm performance. In other

words, the importance of each category of factors varies according to how much emphasis firms place on those factors. For example, all things being equal, if firms ascribe greater significance to events/factors that are associated with firm-specific resources in relation to events/factors that are associated with the institutional environment to achieve firm performance, then this would imply that resource-based factors are viewed as more important in explaining performance, and vice-versa. Therefore, it might be hypothesized that:

> Hypothesis 4: To the extent that both institutional and resource-based factors influence firm performance, institutional factors will be more strongly related to firm performance when firms place more importance on institutional factors compared to resource-based ones.

> Hypothesis 5: To the extent that both institutional and resource-based factors influence firm performance, resource-based factors will be more strongly related to firm performance when firms place more importance on resource-based factors compared to institutional ones.

Testing the above hypotheses requires consideration of two issues: first, identifying the important and relevant determinants of construction firm performance (independent variables) that are derived from institutional and resource-based perspectives, and, second, determining how firm performance (dependent variable) is to be measured. For the purpose of this study, this paper adapts the independent variables and the measure of firm performance previously used by Oliver (1997b).[2] A twofold benefit stems from employing the existing scale items. First, it lends reliability to the scales which is critically important given the exploratory nature of this study, and secondly, the cross-validity of the original scales, which when successfully used outside the North American context where they were developed (Hinkin, 1995; Podsakoff and Dalton, 1986) could be established.

Study approach and method

Sample and procedure

A questionnaire survey was conducted for this study in the summer of 2003. Using trade association and chamber of commerce directories, a population sample of 2602 foreign and local firms in Hong Kong was framed from: (i) the construction-related consulting industry; (ii) the construction contracting industry; (iii) the construction manufacturer and supplier industry; and (iv) construction developers. The sample was believed to represent all construction firms operating in Hong Kong for which contact details, including the name of the most senior executive, were available. Using senior executives as the key informant for this study is deemed appropriate because it has been suggested that senior executive 'acts as the brain of the organization and is the key determinant of its strategic posture' (Dickson and Weaver, 1997, p. 409). Moreover, as senior executives are charged with making key strategic decisions (Papadakis and Barwise, 2002) that are predicated by broader market and institutional frameworks (Rajagopalan and Datta, 1996), their views and perceptions about the determinants of firm performance are likely to correspond to 'real' underlying causal relationships (Partington, 2000, p. 98).

The first questionnaire administration produced 229 responses from senior executives. To boost response and to account for the testing of non-response bias, a reminder questionnaire was sent to identifiable non-responders two weeks after the initial mailing. The second mailing produced a further 297 responses, making a total of 526, a 21.8% response rate.[3] Some 46% of respondents were between 41–50 years old, while 22% were 40 years old or younger; 488 were men and 38 were women; 454 were Chinese and 72 were foreigners from predominantly Britain, Australia, America, Japan and Singapore; 184 had at least an undergraduate degree and 116 had postgraduate degrees; average length of current-job tenure was 13.02 years (s.d. 8.71).

A total of 270 firms were related to the construction contracting industry; 110 were construction consulting firms of one type or another, a further 101 firms belonged to the construction manufacturer and supplier industry; 15 firms were construction developers. Firms ranged from having 2 to 3300 employees, but the average firm size is 50.04 employees (s.d. 259.89). To test for unit non-response bias, Armstrong and Overton's (1977) time trend extrapolation procedure was used. The presumption of this procedure is that respondents replying later to a survey are more likely to resemble non-respondents than early respondents, suggesting that significant differences between initial and second administration respondents would predict differences between those who responded and those who did not. Comparison of first and second administration respondents did not reveal any significant differences in gender (χ^2=0.02, 1 df, p=.87), education (χ^2=.66, 3 df, p=.88) or age (χ^2= 3.50, 4 df, p=.48), indicating that responses could be regarded as broadly representative of the pooled sample.

Measures – independent variables

To test hypotheses 1, 2 and 3, Oliver's (1997b) scale was adapted with four items each representing respectively the extent of relationships between firms and their resource-based (firm-specific) and institutional

(industry-specific) environments that was to be scored in response to the statement 'From your own view, how would you rate the quality of relationship your firm has with each of the following parties'. Extent of quality of relationship for each item was scored on a 5-point interval measure: 1=very poor; 5=very good. For quality of firm's relations with the resource-based environment, four items measuring relationships with (i) developers/clients, (ii) contractors subcontractors, (iii) suppliers and (iv) financial institutions were used. These items relate primarily to the valuable economic and strategic relationships that exist within the construction industry. More specifically, these factors tap an essential resource-based dimension which comprises the important dependencies between parties and the effective management of these relationships to attain sustained firm performance in a competitive market environment (Oliver, 1997b). Cronbach's alpha for these items was .60, indicating that the items demonstrate reasonable internal scale-item reliability.

In addition, firm's quality of institutional environment relations were measured by how well they rate their relationships with (i) quality/safety inspectors, (ii) government agencies,[4] (iii) professional associations[5] and (iv) architects/surveyors/engineers. These institutional factors refer to government and professional interventions and regulations that take the form of mandatory pressures such as compulsory adherence to quality and safety standards that impose strict inspections and benchmarking of, for instance, building quality, safety, and material specifications. Factors reflecting the normative pressures that exist in the industry were also incorporated which relate to the legitimacy of firms' activities such as voluntary and active relationships with professional bodies and trade organizations. These items show a Cronbach's alpha of .74, suggesting that they too manifest adequate internal scale consistency.

Specifically to test hypotheses 4 and 5, a scale measuring the relative importance of firm-specific resource-based and industry-specific institutional factors to firm performance was employed. In line with Oliver's suggestion, the pivotal role in which institutional and resource-based factors play in affecting firm performance lies on the extent to which firms view the regulatory and resource-based forces that exist in the construction industry has a critical impact on firm performance. Following this, respondents were asked to determine how much the (i) scarcity or lack of certain resource-based factors, and (ii) the stringency of the institutional environment, respectively acts as a constraint to firm performance. Specifically, they were asked to score on a 5-point interval measure (1=strongly disagree, 5=strongly agree) the following question: 'Thinking more generally about the construction industry, to what extent do you agree with the following statements'. Constraints pertaining to resource-specific factors were: 'It is generally difficult to hire skilled subcontractors when they are needed'; 'It is difficult to obtain lines of credit or other sources of capital'; 'Land is very scarce in Hong Kong'; 'It is often difficult to obtain necessary supplies on time'. On the other hand, constraints pertaining to institutional pressures were: 'The industry is over-regulated with too many mandatory rules and codes; 'The regulatory environment reduces firms' ability to operate efficiently/profitably'.

Measures – dependent variable

The dependent variable, firm performance was measured using a single item scale that specifically ask about respondent's firm profitability: 'Compared to competitors in your business sector, how profitable do you think your firm has been in the last two years?' (1=very unprofitable, 5=very profitable). Although firm performance can possibly be measured using other indicators, it is argued that the operationalization of firm performance in terms of economic profitability has the advantage of reducing measurement ambiguity and this is consistent with accepted research norm which uses profitability as a proxy for firm performance (e.g. Schmalensee, 1985; Conant *et al.*, 1990; McGahan and Porter, 1997).

Control variables

To control for possibly confounding firm demographic effects, which may have an impact on firm performance, age and size of firms were included. Age of firm was measured as the number of years since establishment in Hong Kong only, while size of firms is measured as the number of employees based solely in Hong Kong.

Results and analysis

Table 1 shows the inter-item correlations for the whole sample and sub-samples by respectively industry sector. All items relating to firms' quality of relations with the resource-based and institutional environments were significantly correlated with firm performance, thus lending support to hypotheses 1 and 2. Also shown prominently from the significant correlation coefficients is that they differ substantially on a sector-by-sector basis, and so, hypothesis 3 is supported, which suggests the influence of both industry-specific

Table 1 Correlation matrix for whole sample and sub-sample correlations with dependent variable[a]

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Contractors	Consultants	Manufacturers & suppliers	Developers
1.Firm performance	2.89	.94																		
2.Developers	3.79	.66	.13†														.18§	.12	−.02	.42
3.Contractors/ subcontractors	3.78	.62	.18§	.20§													.18§	1.4	.25*	−.10
4.Suppliers	3.86	.63	.09*	.15†	.50§												.13*	.08	.08	.22
5.Banks/financial institutions	3.86	.76	.16§	.22§	.23§	.34§											.17†	.13	.18	.45*
6.Quality/safety inspectors	3.60	.65	.17§	.35§	.26§	.21§	.22§										.28§	.01	.15	.28
7.Government agencies	3.61	.71	.15†	.30§	.30§	.14†	.27§	.38§									.17†	.13	.18	−.33
8.Professional associations	3.59	.76	.13†	.30§	.18§	.10*	.34§	.25§	.45§								.17†	.05	.14	−.07
9.Architects/engineers/ surveyors	3.78	.63	.19§	.32§	.26§	.17§	.31§	.34§	.49§	.59§							.22§	.09	.22*	.22
10.Difficulty hiring skilled subcontractors when needed	3.31	.95	−.02	.03	−.05	.03	.04	−.02	.06	.10*	.07						.04	−.04	.01	−.54*
11.Difficult to obtain credit	3.49	.98	−.23§	−.07	−.04	−.01	−.27§	−.14†	−.15†	−.18§	−.10*	.19§					−.23§	−.30†	−.13	−.34
12.Scarcity of land	3.39	.97	−.07	.02	−.06	−.03	−.04	−.07	−.08	−.06	−.04	.14†	.09*				−.14*	.13	−.03	−.01
13.Difficulty obtaining supplies on time	3.05	.88	−.08	−.08	−.06	−.07	−.07	−.12†	−.05	−.02	−.01	.35§	.26§	.16§			−.06	.01	−.18	−.12
14.Over-regulated industry	3.57	1.02	−.02	.12†	.01	−.01	−.04	−.07	.01	−.01	.01	.09*	.14†	.04	.17§		−.02	.01	−.02	−.20
15.Regulatory environment reduces firm's ability to operate efficiently/profitably	2.57	.99	−.06	.09*	−.01	−.01	−.02	−.11*	−.05	−.02	−.07	.04	.09	.04	.12†	.74§	−.08	.08	−.17	−.34

Note: (a) Emboldened item is the dependent variable. Pearson-product moment correlation, listwise deletion. Whole sample n=493; contracting firm sub-sample n=261; consulting firms sub sample n=107; manufacturing and supplier firm sub-sample n=95; developer firm sub-sample n=15; *$p<.05$ $^{\dagger}p<.01$, $^{\S}p<.001$, two-tailed.

institutional and firm-specific resource-based factors on firm performance varies across different sector of firms within the industry. Distinct differences, for instance, can be seen in the contracting firm sub-sample where most of the items were significantly correlated with firm performance, while for the consulting firm sub-sample, only one item relating to the difficulty of obtaining credit registered a significant negative correlation coefficient ($r=-.30$, $p<.05$). Similar clear differences were also found between the developers and, the manufacturing and supplier firm sub-samples where items that were significantly correlated with firm performance were completely different from one to the other. It is logical to postulate that for the manufacturing and supplier sector, establishing good quality relationships with contractors/subcontractors ($r=.25$, $p<.05$) and architects, engineer, and surveyors ($r=.22$, $p<.05$) brings obvious advantage to the firm's business profitability as this is often dependent on how the respective parties liase and negotiate with each other to secure the necessary materials at the right quantity, at the right price and delivered at the right time. On the other hand, developers' need to foster good relations with banks and financial institutions ($r=.45$, $p<.05$) is imperative for the success of the firm in terms of obtaining critical sources of capital for project developments. As can be expected, developers' concern for the difficulty in hiring skilled subcontractors was regarded as having a strong impact on firm performance as indicated by the negative correlation coefficient ($r=-.54$, $p<.05$).

In order to examine the relative impact of the resource-based and institutional factors on firm performance, hence testing hypotheses 4 and 5, partial correlation was conducted. From Table 1, it can be seen that firm performance is positively correlated with suppliers relations ($r=.09$, $p<.05$) and professional associations relations ($r=.13$, $p<.01$). Also observable from Table 1 is that supplier relations itself is significantly correlated with professional associations relations ($r=.10$, $p<.05$). Given that supplier relations contribute to both firm performance and professional associations relations, a first order correlation to partial out the effects of supplier relations was necessary so that a true extent of the influence of professional association relations on firm performance can be obtained and vice versa. The partial correlation between professional association relations and firm performance was $r=.13$, $p<.01$ where both the strength of correlation coefficient and the significance level remained unchanged after the effects of supplier relations was controlled for. On the contrary, when the effects of professional associations relations was partialled out, the relationship between supplier relations and firm performance substantially weakened, as shown in the correlation coefficient and significance level (from $r=.09$, $p<.05$ to $r=.07$, $p>.05$). This indicates that professional associations relations mediates the relationship between supplier relations and firm performance and thus, it can be regarded as a stronger variable compared to supplier relations in affecting firm performance. By the same token, from Table 1 it is shown that firm performance is positively influenced by both developers relations ($r=.13$ $p<.01$) and quality/safety inspector relations ($r=.17$, $p<.001$). In addition, since developers relations is partially explained by quality/inspector relations in terms of variance, partial correlation to control for the effects of each is needed before their unique contribution to firm performance can be determined. The resultant first-order correlation between firm performance and developer relations was $r=.07$, $p>.05$, which was nearly half the correlation coefficient when the effects of quality/safety inspector relations was not controlled for ($r=.13$, $p<.01$). Also, the relationship lost its significance at the 5% confidence level. In contrast, the resultant first-order correlation coefficient between firm performance and quality/safety inspector relations only changed slightly from $r=.17$, $p<.001$ to $r=.13$, $p<.01$ and still retained its significance level when the effects of developers relations were partialled out. This suggests that quality/safety inspector relations is a stronger predictor of firm performance as it mediates the relationship between firm performance and developer relations. Taken together, the results of the partial correlations suggest that factors related to the quality of institutional relationships are regarded as more important determinants of firm performance compared to factors that are associated with resource-based relationships. This would imply that while both institutional and resource-based factors positively affect firm performance, the former appears to play a more important role and, hence, support is found for hypothesis 4 but not hypothesis 5.

Testing hypotheses 4 and 5 in another way, hierarchical regression modelling was conducted to predict the extent to which the constraints imposed by resource and institutional stringencies have on firm performance. In this procedure, four items relating to the difficulty of obtaining critical resource-based factors and two items relating to the overall regulatory and institutional environment of the industry were used. Controlling for the effects of firm age and size, the resource-based factors were entered as a block into the analysis to assess its unique contribution in predicting firm performance (Model A). Similarly, to determine the proportion of unique variance attributable by institutional factors, only the factors pertaining to institutional environment were entered after the effects of control variables were controlled for (Model

Table 2 Hierarchical regression comparing the predictive power of resource-based and institutional factors on firm performance for whole sample and sub-samples

	MODELS[a,b]								
	Whole sample			Contracting firms			Consulting firms		
	1A	1B	1C	2A	2B	2C	3A	3B	3C
Control variables									
1. Firm size	.08*	.12†	.08	.19†	.19†	.19†	−.22†	−.18	−.23†
2. Firm age	−.03	.03	−.03	−.06	.03	−.04	.15	.18	.15
Resource-based factors									
1. Difficult to hire skilled subcontractors	.02	–	.02	.03	–	.02	.06	–	.07
2. Difficult to obtain credit	−.20§	–	−.21§	−.18§	–	−.17†	−.39§	–	−.41§
3. Scarcity of land	−.08	–	−.06	−.15†	–	−.15†	.12	–	.10
4. Difficult to obtain supplies on time	−.03	–	−.04	−.01	–	−.01	.09	–	.07
Institutional factors									
1. Over-regulated industry	–	.06	.10	–	.12	.12	–	.01	.04
2. Regulatory environment reduces firms' ability to operate efficiently/profitably	–	−.11	−.10	–	−.19*	−.16	–	.05	.09
R^2	.06	.02	.07	.10	.06	.11	.18	.05	.19
F statistic	4.96§	2.44†	4.26§	4.16§	3.70§	3.54§	3.48§	1.21	2.83§
df	6,445	4,464	8,455	6,237	4,238	8,233	6,96	4,98	8,94

Notes: (a) Entries represent standardized regression coefficient. *$p<.10$, $^{\dagger}p<.05$, $^{\S}p<.01$ (b) Hierarchical regression is not performed on the manufacturer/supplier and developers sub-samples due to their small sample sizes in order to preserve the integrity to the results.

B). Finally, the effects of both resource-based and institutional factors on firm performance were examined all together by entering all the variables (including the control variables) into the analysis (Model C). The same procedure was performed for the contracting and consulting firm sub-samples.[6] Table 2 shows the three models for the whole sample population and the two respective sub-samples. Model A represents the results when only the resource-based factors were entered into the analysis, at the exclusion of institutional factors while controlling for the effects of firm size and age. On the other hand, model B shows the results of when only the institutional factors were included in the regression, after taking into account the effects of the control variables. Model C is the full model where all the factors were considered together.

The result for the whole sample population shows that one item from the resource-based factors significantly predict firm performance and it explains 6% of the variance in firm performance as indicated by the R^2 value in Model 1A. However, none of the institutional variables in Model 1B significantly predict firm performance. Similar trends appear for both the contractors and consulting firm sub-samples where Models 2A and 3A explain much more of the variance (10% and 18% respectively) in firm performance compared to Models 2B and 3B. In examining the combined effects of both resource-based and institutional factors, Model 2C indicate that for contracting firms, the variable 'Regulatory environment reduces firms' ability to operate efficiently/profitably' did not retain its significance (from $\beta=-.19$, $p<.05$ in Model 2B to $\beta=-.16$, $p=.12$ in Model 2C) when resource-based factors are taken into consideration. This means that resource-based factors fully mediate the relationship between 'Regulatory environment reduces firms' ability to operate efficiently/profitably' and firm performance, such that the variable no longer predicts the variance in firm performance once resource-based factors are taken into account. This would suggest, therefore, that firms regard the lack of resource-based variables as having a greater impact on firm performance than the effects of the stringency of the regulatory environment. Hence, hypothesis 5 is supported while hypothesis 4 is not. Although only two of the four sub-samples were included in the regression

analysis, the results are indicative of the differences in the effects that both resource-based and institutional factors have on different industry sectors, and hence consistent with hypothesis 3.

To sum it up, mixed results were found for hypotheses 4 and 5. For the former, while the factors pertaining to quality of institutional relationships are more predictive of firm performance, hierarchical regressions suggest that the stringency of the regulatory environment does not affect firm performance. For hypothesis 5, the constraints imposed by the difficulty of obtaining critical resource-based factors pose a significant impact on firm performance, but the factors relating to quality of resource-based relationships are not perceived to be as important.

Discussion

The results lend support to the broad proposition that construction firm performance is influenced by firm-specific resource-based factors as well as by industry-specific institutional factors, as manifested by the substantiation of hypothesis 1 and 2. This concurs with the work of previous researchers that propose that these two sets of factors jointly predict firm performance (DiMaggio and Powell, 1983; Zucker, 1987; Oliver, 1996). Support for hypothesis 3 also confirms the view that because different sectors within the construction industry are subjected to different institutional and resource-based circumstances, they are likely to be differentially affected by industry- and firm-specific factors. However, results relating to the respective importance of firm- and industry-specific factors reveal that indeed, the effects between the two on firm performance are not as clear-cut as expected. That mixed results were obtained for hypotheses 4 and 5 underscores the inter-relatedness of these factors in terms of their impact on firm performance. Interestingly, the extent to which industry- and firm-specific factors affect firm performance is dependent upon the specific nature of the factors under consideration such that institutional factors that are associated with quality of relationships (i.e. quality/safety inspectors and professional associations) are deemed more crucial to construction firm performance, whereas the stringency of the regulatory environment has negligible impact on firm performance. Possible explanations as to why this may be the case point to the fact that certain mandatory relationships that exist in the industry and the adherence to these determine the survival of firms. Quite simply, non-compliance with, for instance, safety and quality pressures precludes firms from operating successfully in the market. However, insofar as firms need to comply with these obligatory regulations they do not consider that the regulatory environment of the construction industry to be overly stringent to the extent that it hampers their ability to perform efficiently and profitably.

Conversely, it seems that the scarcity or difficulty in obtaining critical resource-based factors are regarded as having a strong influence on firm performance while resource-based factors that are related to quality of relationships (i.e. developers, suppliers) are considered as less important. Any logical suggestion offered to explain this result would inevitably need to take into account of how the lack of or difficulty in acquiring the critical factors of production such as capital, labour or materials could necessarily put any firm out of business whereas the voluntary relationships that firms establish with developers, suppliers and banks (while no doubt are advantageous to the firm) are by no means critical to firm performance.

Therefore, in a nutshell, the results provide two crucial insights: first, it forms an important basis on which to pursue *not* just the inquiry into whether firm performance is determined more by industry- or firm-specific factors but rather what are the particular types of industry- and firm-specific factors that are vital to firm performance; second, it suggests that although these factors are often assumed to be intertwined and complex, their respective impact on firm performance can still be systematically assessed and understood.

This study has some limitations that deserve mentioning. Due to the cross-sectional nature of the study, results obtained cannot be taken as explaining causality between relationships. The relatively low R^2 in the regression analysis corresponds to the point made by Child (1975) that there are numerous factors associated with firm's institutional and economic environments such that no single factor is likely to have very much effect on its own on firm performance. Although this study uses existing variables from previous study and hence, lending reliability to the scale items, future research should expand the investigation to cover the effects of other factors not included here. The modest response rate and the somewhat small sub-sample size of certain sectors like developer and manufacturer firms renders the multiple regression analysis unworkable, and so, future research could be usefully replicated to look at these sectors.

Conclusion

This study builds upon the premise that there are academic and practical merits in exploring, using a more systematic and empirically rigorous approach, the

factors that drive construction firm performance. More specifically, the study addresses two fundamental issues in construction management research that have not been seriously considered to date. First, it addresses the paucity of research in identifying the determinants of construction firm performance and proposes a framework based on resource-based and institutional perspectives to examine what these determinants might be. Second, it addresses, by way of the research findings, the complex interplay between industry- and firm-specific factors and argues that to the extent that both these two groups of factors affect construction firms, it is necessary to identify the specific type of factors that most predict firm performance. By modelling the sector-by-sector differences of their respective influences on firm performance the results highlight the fact that because different (albeit sometimes only small variations) institutional and resource-based circumstances exist in each sector, the perceived importance of the determinants of firm performance should not be taken to be uniformly applicable or relevant across the industry. Hence, researchers should be cautious not to over-generalize the effects as this could mask the real constraints and opportunities that various industry- and firm-specific factors pose which might otherwise be gleaned from examining their specific contributions toward firm performance.

However, due to the exploratory nature of the study, confirmatory studies are warranted to validate the findings reported here. This would be a much-needed next step given the complexity of the interplay between organizational resources and the environment. Once this is adequately undertaken, future work may usefully extend the present study into a comparative country study to investigate whether construction firm performance is driven more or less by industry- or firm-specific factors in for instance, industrialized countries like the UK or USA and a developing economy like China. Might it be that in an emerging economy like China, given its rudimentary institutional frameworks, firms do not perceive institutional factors as having much impact on firm performance, whereas in industrialized countries, government regulations and policies might pose greater constraints on firm activities and hence have a stronger influence on firm performance? This line of research will inform both researchers and practitioners about the circumstances that lead to performance heterogeneity in the industry.

Notes

1. Whether such level of institutional demands acts as an impediment to firm performance and stifles firm's ability to generate profits is a separate issue, which may be worth considering.
2. The exact scale items and their respective reliabilities will be explained in detail in the following sections.
3. The response rate is considered satisfactory for a reasonably lengthy four-paged questionnaire and compares well with the response rates reported by other researchers for business surveys in Hong Kong and the Asia Pacific (e.g. Jobber *et al.*, 1991; Harzing, 1996)
4. To avoid ambiguity, for this item, a list of examples was given to clarify what is meant by 'government agencies'. Examples included Buildings Department, Architectural Services Department, Housing Authority, Construction Industry Training Authority.
5. Examples of professional associations included Hong Kong Institute of Engineers, Hong Kong Institute of Architects, Hong Kong Institute of Surveyors, Hong Kong Institute of Facilities Management.
6. The analysis for manufacturing/supplier and developer sub-samples were omitted because of their restricted sample size after residual diagnostics were undertaken to remove outliers. The conservative guideline for regression modelling recommends a ratio of five cases to one variable.

References

Arditi, D., Koksal, A. and Kale, S. (2000) Business failures in the construction industry. *Engineering, Construction and Architectural Management*, **7**, 120–32.

Armstrong, J.S. and Overton, T.S. (1977) Estimating nonresponse bias in mail surveys. *Journal of Marketing Research*, **14**, 396–402.

Barney, J.B. (1986) Strategic factor markets: expectations, luck and business strategy. *Management Science*, **32**, 1231–41.

Barney, J. (1991) Firm resources and sustained competitive advantage. *Journal of Management*, **17**, 99–120.

Barney, J., Wright, M. and Ketchen, D.J. Jr. (2001) The resource-based view of the firm: ten years after 1991. *Journal of Management*, **27**, 625–41.

Bresnen, M. (1990) *Organising Construction: Project Organisation and Matrix Management*, Routledge, London.

Cherns, A.B. and Bryant, D.T. (1984) Studying client's role in construction management. *Construction Management and Economics*, **2**, 177–84.

Chan, A.P.C., Scott, D. and Chan, A.P.L. (2004) Factors affecting the success of a construction project. *Journal of Construction Engineering and Management*, **130**, 153–65.

Child, J. (1975) Managerial and organizational factors associated with company performance – Part II, a contingency analysis. *Journal of Management Studies*, **12**, 12–27.

Chua, D.K.H., Kog, Y.C. and Loh, P.K. (1999) Critical success factors for different project objectives. *Journal of Construction Engineering and Management*, **125**, 142–50.

Conant, J.S., Mokwa, M.P. and Varadarajan, P.R. (1990) Strategic types, distinctive marketing competencies and organizational performance: a multiple measures-based study. *Strategic Management Journal*, **11**, 365–83.

Dickson, P.H. and Weaver, K.M. (1997) Environmental determinants and individual-level moderators of alliance use. *Academy of Management Journal*, **40**, 404–25.

DiMaggio, P.D. and Powell, W.W. (1983) The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, **48**, 147–60.

Granovetter, M. (1985) Economic action and social structure: the problem of embeddedness. *American Sociological Review*, **91**, 481–510.

Hall, G. (1994) Factors distinguishing survivors from failures amongst small firms in the UK construction sector. *Journal of Management Studies*, **31**, 737–60.

Hansen, G.S. and Wernerfelt, B. (1989) Determinants of firm performance: the relative importance of economic and organizational factors. *Strategic Management Journal*, **10**, 399–411.

Harzing, A.W. (1996) How to survive international mail surveys: an inside story, in *Innovation and International Business*, Vol. 1, Proceedings of the Institute of International Business 22nd Annual Conference, Stockholm, 15–17 December.

Hawawini, G., Subramaniam, V. and Verdin, P. (2003) Is performance driven by industry- or firm-specific factors?, A new look at the evidence, *Strategic Management Journal*, **24**, 1–16.

Hillebrandt, P. and Cannon, J. (1990) *The Modern Construction Firm*, Macmillan, London.

Hinkin, T.R. (1995) A review of scale development practices in the study of organizations. *Journal of Management*, **21**, 967–88.

Hoopes, D.G., Madsen, T.L. and Walker, G. (2003) Why is there a resource-based view? Toward a theory of competitive heterogeneity. *Strategic Management Journal*, **24**, 889–902.

Jobber, D., Mirza, H. and Wee, K.H. (1991) Incentives and response rates to cross-national business surveys: a logit model analysis. *Journal of International Business Studies*, **22**, 711–21.

Kale, S. and Arditi, D. (1998) Business failures: Liabilities of newness, adolescence, and smallness. *Journal of Construction Engineering and Management*, **124**, 458–64.

Kangari, R. (1988) Business failure in construction industry. *Journal of Construction Engineering and Management*, **114**, 172–90.

Langford, D., Iyagba, R. and Komba, D.M. (1993) Prediction of solvency in construction companies. *Construction Management and Economics*, **11**, 317–25.

Lawrence, T.B., Hardy, C. and Phillips, N. (2002) Institutional effects of interorganizational collaboration: the emergence of proto-institutions. *Academy of Management Journal*, **45**, 281–90.

Lippman, S.A. and Rumelt, R.P. (1982) Uncertain imitability: An analysis of inter-firm differences in efficiency under competition. *Bell Journal of Economics*, **13**, 418–38.

McGahan, A. and Porter, M.E. (1997) How much does industry matter, really? *Strategic Management Journal*, **18**(summer special issue), 15–30.

Naoum, S. (2001) *People and Organisational Management in Construction*, Thomas Telford, London.

Oliver, C. (1996) The institutional embeddedness of economic activity. *Advances in Strategic Management*, **13**, 163–86.

Oliver, C. (1997a) Sustainable competitive advantage: Combining institutional and resource-based views. *Strategic Management Journal*, **18**, 697–713.

Oliver, C. (1997b) The influence of institutional and task environment relationships on organizational performance: the Canadian construction industry. *Journal of Management Studies*, **34**, 99–124.

Papadakis, V.M. and Barwise, P. (2002) How much do CEOs and top management matter in strategic decision-making? *British Journal of Management*, **13**, 83–95.

Partington, D. (2000) Building grounded theories of management action. *British Journal of Management*, **11**, 91–102.

Peteraf, M.A. (1993) The cornerstones of competitive advantage: a resource-based view. *Strategic Management Journal*, **14**, 179–91.

Phua, F.T.T. (2004) Modelling the determinants of multi-firm project success: a grounded exploration of differing participant perspectives. *Construction Management and Economics*, **22**, 451–9.

Pinto, J.K. and Slevin, D.P. (1988a) Project success: definitions and measurement techniques. *Project Management Journal*, **19**, 67–71.

Pinto, J.K. and Slevin, D.P. (1988b) Critical success factors across the project life cycle. *Project Management Journal*, **19**, 67–75.

Podsakoff, P.M. and Dalton, D.R. (1987) Research methodology in organizational studies. *Journal of Management*, **13**, 419–41.

Pries, F. and Janszen, F. (1995) Innovation in the construction industry: the dominant role of the environment. *Construction Management and Economics*, **13**, 43–51.

Proverbs, D.G. and Faniran, O.O. (2001) International construction performance comparisons: a study of 'European' and Australian contractors. *Engineering, Construction and Architectural Management*, **8**, 284–91.

Rajagopalan, N. and Datta, D.K. (1996) CEO characteristics: does industry matter? *Academy of Management Journal*, **39**, 197–215.

Rumelt, R.P. (1991) How much does industry matter? *Strategic Management Journal*, **12**, 167–85.

Schmalensee, R. (1985) Do markets differ much? *American Economic Review*, **75**, 341–51.

Scott, W.R. (1987) The adolescence of institutional theory. *Administrative Science Quarterly*, **32**, 493–511.

Scott, W.R. (1995) *Institutions and Organizations*, 1st edn, Sage, Thousand Oaks, CA.

Scott, W.R. (1998) *Institutions and Organizations*, 2nd edn, Sage, Thousand Oaks, CA.

Shenhar, A.J., Dvir, D., Levy, O. and Maltz, A.C. (2001) Project success: a multidimensional strategic concept. *Long Range Planning*, **34**, 699–725.

Shenhar, A.J., Tishler, A., Dvir, D., Lipovetsky, S. and Lechler, T. (2002) Refining the search for project success factors: a multivariate, typological approach. *R&D Management*, **32**, 111–126.

Stumpf, I. (2000) Competitive pressures on middle-market contractors in the UK. *Engineering, Construction and Architectural Management*, **7**, 159–68.

The Economist, (2004) The rise of the green building. *The Economist*, **373**(8404), 18–20.

Walker, A. (2002) *Project Management in Construction*, 4th edn, Blackwell Publishing, Oxford.

Wernerfelt, B. (1984) A resource-based view of the firm. *Strategic Management Journal*, **5**, 171–80.

Yeoh, P.L. and Roth, K. (1999) An empirical analysis of sustained advantage in the US pharmaceutical industry: impact of firm resources and capabilities. *Strategic Management Journal*, **20**, 637–54.

Zucker, L.G. (1987) Institutional theories of organization. *Annual Review of Sociology*, **13**, 443–64.