Organisational Performance: A study of China's large construction state-owned enterprises

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Abstract

China's construction State-owned Enterprises (SOEs) remain tormented by impotent long-term competitiveness and lack of knowledge about how to adapt to the market economy environment. This study investigates the interaction between firms' external environment, internal resources and competences, and organisational performance. By combining industrial/organisational theory and the resource based view, this research explores the relations between large construction SOEs and their organisational performance under evolving environmental factors. The study uses structural equations modelling of questionnaire survey data to analyse the inter-relationships of the external environment and organisations' resources and competences. Internal resources and competences are important in determining SOE's organisational performance.

Keywords: China; Competences, I/O Theory; Organisational Performance, Resource-based View, State Owned Enterprises; Strategic Management.

Introduction

Since the early 1950's, China's large organisations have been state-owned enterprises (SOEs). Under the state-planned/command economy, which operated until reform and opening was initiated in 1978 (Luo and Gale, 2000), work and resources were allocated to organisations and both input costs and output prices were stipulated by governmental agencies (management by governmental decree – Zhu, Hu and Wang, 2001); performance requirements concerned meeting (or surpassing) output quantity targets, supplemented by maintaining good relationships with appropriate officials. Under the transitioning to a market economy, the control by decree (and protected) environment has, progressively and largely, vanished and given way to market competitive operational criteria (controlled by regulation – Zhu *et al.*, 2001 – which are open to local variation of interpretation and application). The changes gathered further momentum with China's accession to the World Trade Organization (WTO) on 11 December 2002.

China's construction enterprises continue to enjoy great benefits and opportunities associated with the enduring, rapid growth of the domestic economy – which achieved annual GDP (gross domestic product) growth of 9.5% from 1979 to 2006 (Wen, 2007). At the same time, however, they have to face more challenges than ever. In addition to competition from domestic organisations, because of China's entry into the World Trade Organisation, construction enterprises in China face increasingly fierce competition from international contractors (Liu, Liu and Hao, 2002).

Critically, China's transition from a command-planned economy to a market economy (with Chinese, socialist characteristics), together with rapid technological development and the trend towards globalization, constitutes a radically changing environment, which challenges the resilience and adaptability of the construction enterprises. However, the dominant players in the domestic construction industry, the state-owned enterprises (SOEs), remain burdened with large (often socially-oriented) overheads and riddled with sluggish performance, particularly economic performance (Mako and Zhang, 2003; Sha and Lin, 2001). Thus, the research question is *"how can construction SOEs meet the challenges and take full advantage of the opportunities to survive and develop in the competitive and changing environment with sustained competitive advantages?"*

RESEARCH AIM

In order to address the research question stated above, it is necessary to probe what ultimately determines firms' superior organisational performance. Hence, this paper develops a competence-based model to examine the inter-relationships of the firm's resources and competences in meeting environmental challenges.

Two mainstream models in strategic management, the Industrial/ Organisational (I/O) model and the Resource-Based View (RBV), have made significant contributions in this regard. The I/O model, taking an outside-in perspective, argues that superior performance is achieved when firms implement strategy to accord with the characteristics imposed by the external environment (Porter, 1980 & 1985). The RBV adopts an inside-out perspective and so, argues that the critical factors for success lie

within the firm itself in terms of its resources and capabilities (Wernerfelt, 1984; Barney, 1991; Teece, Pisano and Shuen, 1997).

The debate between external and internal determinants of competitive advantage has developed into the perspective of regarding the two categories of determinants as complementary, instead of viewing them as competing or even contradicting (Mauri and Michaels, 1998; Claver, Molina and Tari, 2002). Although it is widely accepted that both the external environment and internal resources are important determinants of firms' superior performance, few empirical studies examine how these factors interact and determine the performance of an organisation. Management theories, including the aforesaid ones, often draw on production industries for theoretical reasoning and empirical tests, while very little research concerns sustained competitive advantages of construction enterprises.

Additionally, the main management perspectives acknowledge the potential explanatory enhancement of examining the theories in combination with transaction cost economics (as part of institutional economic theory, whether Cosian, Williamsonian, or other) and, especially in respect of more fragmented industries, agency theory may offer extended insights. Further complications arise due to the transitory state of the economy and society in China. That economy should be distinguished from others which have moved away from a centrally-planned or (state) command system towards market capitalism as the China economy has changed in quite individual, stepwise ways.

The continuous 'controlled transition' has included establishment of special economic zones, the repatriation of Hong Kong and Macau, revision of housing provision (from enterprises as employers to the private sector). Ownership of enterprises has been restructured towards privatisation, although many large SOEs remain and ownership of many privatised enterprises remains under state control. Many social provisions (education, health care, etc.) by enterprises has been transferred to local government. Those changes have required, and been dependent upon, extensive development of financial institutional infrastructure (see, Luo and Gale, 2000; Sha and Lin, 2001; Lam and Chen, 2004; Cheah and Chew, 2005; Hutton, 2006). Of particular importance for construction have been changes in company law relating to the forms of business units allowed and how overseas firms are permitted to operate in China, revisions of construction law and of tendering law which relate to licensing, approvals and regulation of bidding and project work allocation (see, Lam and Chen, 2004; Zhu *et al.*, 2001), as well as general contract law with the translation and, consequent, widespread use of the FIDIC (Fédération Internationale des Ingénieurs-Conseils) contract (see http://www1.fidic.org/resources/contracts/describe/FC-AB-A-AA-0P.asp).

Thus, construction activity in China remains subject to considerable regulation via various authorities of different tiers of government, as outlined in Figure 1. However, it should be acknowledged that even national-level legislation is likely to be applied in different ways at provincial, city and other levels.

Figure 1 about here

Project and organisational performance is critical for both China's national development and for its construction organisations. China's large construction organisations must compete successfully in the domestic market and in the international markets if they are to survive and to realise their profitability and growth aspirations. Although they may remain advantaged domestically, those advantages are eroding and, internationally, their performance is ever more subject to scrutiny and criticism in the global arena (see, Cheah and Chew, 2005), which constrains their geographical regions of working. Table 1 provides some main indicators of construction enterprises over recent years and figure 2 provides indictors of productivities.

Table 1 about here

Figure 2 about here

Taking the above into consideration, the research aim is to "*explore the relationships between firms' external environment (EE), internal resources and competences (R&C), and organisational performance (OrgPer) in the context of China's large construction SOEs through integrating the I/O theories and the RBV into a holistic competence-based model of organisational performance*".

THEORETICAL BASIS FOR A COMPETENCE-BASED MODEL

Given that the context of the study is the rapidly and extensively changing society and economy of mainland China, the major theoretical paradigms of (strategic)

organisational behaviour should be employed circumspectly and with reference to determination of organisational objectives, rather than, merely, assuming the usual objectives and behavioural pressures and constraints derived from research in and based upon 'Western' organisational behaviour paradigms and models. However, with the recent direction and extent of movement of China towards market capitalism, it is reasonable to assume the utility seeking (maximising) objective applies, as manifested in firms endeavouring to create, protect, appropriate and capture value (see, Foss, 2003; Cox, 1999).

I/O Theories

The basis of I/O theories, as derived from neoclassical economics and management theories – notably, the behavioural theory of the firm – is the Structure-Conduct-Performance model (McDermott, 2003). Under that model, a firm's performance is determined by the structure of the industry in which it operates as mediated by the conduct (strategy) of the firm. Criticisms of the basic model, concerning instability of industry structures and effects of strategic choices, prompted the development of Porter's five forces model (Porter, 1980) under which firms determine their strategy, and, hence, performance, in evaluating and responding to the five categories of environmental forces – bargaining power of suppliers; bargaining power of buyers; potential new entrants; actual and potential substitutes; and incumbent competitors.

Thence, Porter (1980) asserts that a firm would select one of three generic strategies to safeguard its position and enhance its performance – cost leadership; differentiation; and focus. Peters and Waterman (1982), following their study of a number of the

'best managed' companies in the USA, determine that the companies shared most, if not all, of eight qualities – a bias for action, be close to the customers, promote autonomy and entrepreneurship, encourage productivity through people, be hands-on and value driven, stick to the knitting (focus), have simple form and lean staffing, have simultaneous loose-tight properties. However, the robustness of Peters and Watermans' findings are questionable due to the subsequent poor performance of many of the allegedly excellent companies and revelations over the execution of the study (Peters, 2001).

Thus, I/O theories may be categorised as contingent, or situational, given that the strategy which should yield superior performance is dependent upon the environment and how it is perceived (forecast to change and the consequent response actions) by the firm.

Resource-Based Views

Porter's (1980) model assumes that the environment imposes tensions and restrictions which, then, determine strategies, also that competitors have access to/control similar resources (resource homogeneity), and the resources are mobile between firms (resource markets are regarded as reasonably efficient allocating mechanisms). Hence, the environment determines the strategy required to secure competitive advantage. The economic theory of contestable markets leads to some modifications through its assertion that the only barrier to entry for potential competitors is the 'sunk costs' of entry (Lipsey, 1989: 252). With regard to Williamsonian transaction cost theory, Mahoney (2001) argues that "…asset specificity (sunk cost commitment) is a

necessary condition for isolating mechanisms that sustain rents" and that "Often the firm achieves sustainable competitive advantage (i.e., sustains rents) because it reduces opportunistic behavior and allows for firm-specific investment". Thus, significant 'market forces' operate to protect domestic enterprises in China from competition from international organisations (including language, operation of local regulation systems, and *guanxi*).

Barney (1991) asserts that resources are "…assets, capabilities, organisational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness." Even more generally, a resource is anything which provides, or may provide, value, which, in this context, relates to (market) worth and can be categorised as business, technological, and relational. Barney employs three categories of resources – physical capital resources, human capital resources, and organisational resources – but cautions that only resources which comprise value (generate rents which the firm can appropriate; see also Cox, 1999), rareness, inimitability and non-substitutability can be used by a firm to secure long term superior performance over competitors.

Since its inception, marked by Wernerfelt's (1984) prominent work, the RBV has spawned a large number of new approaches and ideas, which enrich and refine the view of firms with increasing scope and explicitness. Among these new developments, the schools that have attracted extensive popularity and discussion are the capabilities and competence-based theory (Prahalad and Hamel, 1990; Henderson and Cockburn, 1994) and the dynamic capabilities approach (Teece, *et al.*, 1997; Eisenhardt and Martin, 2000). Although scholars use different models and concepts

of resources, capabilities, and competences, the essence of them is the same, i.e. they all are distinctive assets within a firm, which , depending on how they are used and combined, can generate superior organisational performance.

DEVELOPING A COMPETENCE-BASED ORGANISATIONAL PERFORMANCE MODEL

Conceptual Frameworks

In the conceptual frameworks of the external environment, competences and organisational performance adopted in this paper, resources are the inputs to the firm which are converted into outputs (products or services to customers) through a series of functions, processes, routines, etc. Thus, a unique portfolio of resources and capabilities, rather than a single distinctive capability or core competence, ultimately leads to superior organisational performance. Hence, the employment of competences/capabilities constitutes the (transformation/conversion) process which yields superior performance – these variables are discussed below.

External Environment

The external environment of an organisation can be defined as “everything outside an organisation's boundaries that might affect it” (Davidson and Griffin, 2006). Many researchers and theorists have studied the composition of a firm’s environment (Daft, 2001; Wit and Meyer, 2005; Fitzroy and Hulbert, 2005) and conclude that it constitutes either a source of information or a repository of scarce resources which are sought by competing firms; commonly, the environment is regarded as comprising

both. It is helpful to categorise the external environment of a firm into two levels, i.e. remote environment and industry environment, as shown in Figure 3.

Figure 3 about here

Although there is general consensus that the environment is multidimensional, no strong agreement has been reached about the dimensions that should be used to characterise the environment or how these different constructs should be defined (Dess and Rasheed, 1991). According to Gustafson (2003), four dimensions are important in understanding the external environment – munificence, dynamism, complexity, and hostility. Munificence is the quality of environmental factors, mainly reflected in resource abundance, which allows organisations to grow and to stabilize; dynamism refers to the stability of factors critical to the firm and the rate and extent of change or level of predictability; complexity means the level of heterogeneity in the organisation's environment and the predictability of competition (uncertainty); hostility refers to the degree of threat that faces organisational decision-makers.
A further function of the environment is to contain and transmit signals of performance requirements for survival and for success. The sources of such signals are dependent upon the nature of the society and how the domestic society relates to the global context. Thus, the signals originate in government(s), market places for the outputs and resources, and the global financial markets. Recent historical developments and perceptions of future performance imperatives seem to be the primary determinants of how organisations structure and position themselves.

<u>Competence</u>

Prahalad and Hamel (1990) define core competence as "…the collective learning in the organisation, especially how to coordinate diverse production skills and integrate multiple streams of technology…" which are identified through customer value, differentiation, and extendability. Thus, competences are the means (processes) by which firms deploy resources in order to compete. Core (or distinctive) competences are used to differentiate between success and failure and so, the argument has grave danger of becoming tautological (Drejer, 2002).

Dosi, Nelson and Winter (2000) define capability as organisational knowledge which Verona (1999) separates into functional and integrative capabilities. Strategic capabilities are "…complex bundles of skills and accumulated knowledge that enable firms. … to coordinate their activities and make use of their assets" (Day, 1990: 38) to create economic value and to sustain competitive advantage (potentially, tautological).

Distinction between competence and capability is far from clear in the literature; the terms tend to be employed (almost) interchangeably (see, Barney, 1991)! Winter (2003) considers organisational capabilities to be high level (strategic) routines which, together with flows of inputs, provide management with an array of decision options for the production of significant (high performance) outputs.

Organisational Performance

Organisational performance is a complex construct, which can be examined through various methods from different disciplinary perspectives (Sirgy, 2002). In spite of the

divergent perspectives on organisational performance measurement, over the past two or three decades, performance measurement has evolved from a component of the planning and control cycle relying on financial information (cybernetic view) to an independent process used as signalling and learning devices, which provide indicators for strategic purposes based on multiple financial and non-financial measures (holistic view) (Henri, 2004).

The variables which combine to yield the construct of organisational performance are subject to constant change in terms of both their identities and relative importance. That occurs due to the relationship between organisational performance, as metrics of organisational throughputs and outputs, and the uses of those measures and indicators of both organisational effectiveness (outputs) and organisational efficiency (processes). Both comprise evaluations of performance against criteria so, whilst the performance metrics may remain as a constant array, it is those metrics and their weightings which are deemed useful, from the diverse evaluation perspectives, which change. Historically, in market economies, financial performance, especially in respect of profit, profitability and turnover are paramount. More recently, much greater diversity of performance metrics apply – including ethics, corporate social responsibility and environmental protection measures – in supplement to the dividend stream (Hutton, 1996), organisational size and growth, and other financial performance metrics .

Thus, to address the issue of long term organisational success, it is appropriate to adopt a flexible set of organisational performance metrics which develop in respect of the changing operational environment in including and appropriately weighting those socio-economic groups which exert power over the organisation and the performance

criteria of each. Clearly, that is a temporally-evolving array of metrics and mediated by the perceptions of those who manage the organisation (which, itself, may be seen as an organisational competence).

Given the extensive and fundamental changes which have occurred in China since 1970, today, many of the operational requirements (corporate ownership and control) which organisations must address remain fuzzy (see, Hutton, 2006) and exist in an environment of considerable 'corruption' (see, Transparency International, 2008). In the era of closed central planning, the performance requirements were dictated by government via the work allocation and reporting system – promoting the organisational competence of maintaining good relations with government (officials). Today, other competences are required in accordance with China's greater orientation to and involvement in international capitalist markets but, seemingly, the relationship of the stakeholders with government and its agents, indeed the gamut of '*guanxi*', remains strong (see, So and Walker, 2006).

The stakeholders approach takes a holistic view and is widely accepted as one of the most appropriate paradigms to understand organisational performance. According to Fitzroy and Hulbert (2005), the most critical stakeholders of a firm comprise shareholders, customers, and employees. Putting this framework in the context of China's construction SOEs, organisational performance can be defined as the value or benefit created by the organisation for its principal stakeholders, i.e. owners (the state), clients, and employees – as measured by a set of indicators, as shown in Figure 4.

Figure 4 about here

Towards a conceptual model

Based on the above conceptual frameworks, a competence-based model is developed with reference to Hafeez, Zhang and Malak (2002), as shown in Figure 5.

Figure 5 about here

The vital element, *integration*, is emphasised (following Lawrence and Lorsch, 1967). In this model, a portfolio of resources and competences is at the core such that, by coordinating and integrating all functions, processes, and routines superior organisational performance is delivered through adaptation to the external environment. The hypotheses derived to address the research question are:

H 1: *Both internal resources and competences contribute positively to a construction SOE's organisational performance*.

H 2: *External environment is an important determinant of the organisational performance for construction SOEs*. Sub-hypotheses derived from H2 are tested as below:

H 2.1 *The more stable is a firm's external environment, the better is its organisational performance.*

H 2.2 *The environment munificence affects a construction SOE's performance positively*

H 2.3 *The industry competitiveness (IC) affects the organisational performance of a construction SOE inversely*

H 2.4 *The industry monopolism (IM) affects positively the organisational performance of a construction SOE*

H 3: *In comparison, internal resources and competences play a more important role in determining a construction SOE's organisational performance than the external environment does*.

RESEARCH DESIGN

In order to provide results regarding large construction SOEs in China, a quantitative survey approach is adopted. A comprehensive questionnaire is developed on the basis of the literature review, adaptation and extension of an existing, tested instrument (based on McDermott, 2003 and as detailed, above) and the results of the pilot investigation of four large construction SOEs in China. Issues concerning collecting data through questionnaires are well known; however, the approach remains in widespread use to secure data from an extensive sample. Hence, three case studies were also conducted amongst SOEs, selected to be indicative of the questionnaire sample and population, in which a total of fifteen management personnel were interviewed and archival data were examined; the case studies were carried out as both verification of the results of analyses of the questionnaire-derived data and to secure supplementary detail. The case studies, notably, served to assist verification of data etc. as in checking meaning in ethnographic and other qualitative studies with primary actors in a social group or focus group verification exercises (extensively discussed in, Silverman, 1997). The measurement constructs (and refinement after the pilot investigation), data collection methods and analysis techniques are discussed below.

Measurement of constructs

The primary constructs to be measured in the empirical investigation are organisational performance (OrgPer), internal resources and competences (R&C), and the external environment (EE) of the firm. The constructs are "…theoretical creations based on observations but which cannot be observed directly or indirectly…" (Babbie, 1989: 109). Commonly, constructs comprise latent variables (cannot be observed or measured directly; manifest indicators are used to 'measure' such variables) and manifest (observable) variables.

The questionnaire of McDermott (2003) was employed and extended, through the results of the literature review, to include questions concerning the external environment. Further, amendments were incorporated to address issues particular to the China context and to large construction SOEs. The questionnaire was forward and back translated into Chinese independently. Eight experienced persons form four large construction SOE's completed the questionnaire and were interviewed as the pilot study.

Results from the pilot investigation demonstrate that the items of complexity and hostility under the construct, external environment (EE) appear to be obscure and difficult for the respondents to understand; how those items affect a firm's performance is not evident. Hence, to avoid disturbance occasioned by the vagueness of definition and comprehension by respondents concerning complexity and hostility, only munificence and dynamism dimensions are considered in the main research to

assess features of the macro environment. For the industry environment, competitiveness and monopolistic state within the industry are the critical factors, which theory suggests to be highly correlated as they both reflect the competitiveness of the industry (sector). Thus, four main dimensions are determined to manifest EE, namely, environment's munificence (EM), environment's stability (or dynamism) (ES), industry competitiveness (IC), and industry monopolistic state (IM). Twelve questions are included to measure those four dimensions.

According to the pilot investigation, the resources within a typical construction firm comprise four main categories: physical resources (PhyR), financial resources (FinR), human resources (HumR) and intangible resources (IntR). The composition and classification of competences for construction SOEs are investigated. McDermott (2003) divides competences into two groups, i.e. functional competences and integrative competences. Functional competences (FunC) are the local technologies, abilities and knowledge that are fundamental to each of the functional domains; integrative competences (IntC) denote those competences that allow the firm to acquire, distribute and integrate resources and information inside and outside the organisation, including external boundary spanning competences (EBS) and internal management competences (IMC), as noted in Table 3.

Table 3 about here

Five indicators, namely, annual turnover (AR), annual revenue growth (ARG), return on total assets (ROA), total assets (TA), and market share (MS), are selected out of the 13 indicators in the framework to measure firms' OrgPer. These indicators represent

the most important performance indicators in the current performance measurement system used by construction SOEs in China according to the results of the pilot investigation. For measurement of OrgPer and R&C, respondents are asked to evaluate the firms' position in the whole industry by using a 5-point Likert scale through comparing their firms' performance and internal resources and competences to the best firm in the industry in terms of the given indicators.

Data collection and analysis methods

The overall population of construction enterprises in China is shown in table 1. However, as the study investigates the relationship between construction organisations' performance in the significantly changing environment of China, organisations which have existed for some time are required to capture their responses to and consequences of the changes. Thus, large enterprises are selected; further, the category of large SOEs (see table 2) execute over 50% of the work of all contruction SOEs.

The population for this empirical study is large construction SOEs, totalling 273 organisations according to the national classification standard (NBS, 2003). In order to ensure that the sample represents the population, a hybrid sampling strategy combining stratified and random methods is used. China comprises 31 provinces, autonomous regions, and directly governed cities of which 10 are selected based on available contacts; in each location, 50% of the large construction SOEs with a major office there are selected randomly – yielding a sample of 136 enterprises. Generally, 3-5 people from each enterprise are selected as the respondents, comprising 1-2 from

top, 1-2 from middle and 1 from lower levels of management. The rationale for such selection is that top management concerns the strategic level, middle management has detailed knowledge of the activities of departments within the context of the enterprise, and lower management possesses detailed operational knowledge; hence, such sampling captures comprehensive data concerning the enterprises.

After survey data are collected, reliability of the construct measurement is examined by computing the standard test statistics of Cronbach's Alphas and item-total correlations; the validity of the measurement is tested by conducting confirmatory factor analysis. Prior to estimation of measurement models, the assumptions that are required by the Structural Equations Modelling (SEM) technique are tested. The research hypotheses (see above) are tested with confirmatory factor analysis and path analysis using the structural equations modelling technique with maximum likelihood estimation method being adopted (AMOS 5.0). Generally, the 95% level is used for testing of significance – details are included in the results section.

SEM is used extensively in social and behavioural science research and constitutes a hybrid of combining factor analysis and path analysis (Kaplan, 2000). Measurement links observed variables to latent variables via a confirmatory factor model which is combined with structurally linking the latent variables via simultaneous equations (Jöreskog, 1973). Hoyle (1995) stresses the flexibility and comprehensiveness of SEM in comparison to other statistical methods, which is confirmad and extended by Grace (2006). Hence, given that evidence and the subject matter of this investigation, SEM is selected.

RESULTS

In the survey, 452 questionnaires were sent out and yielded 164 questionnaire returns (response rate of 36.3%), out of which 150 viable and valid questionnaires were finally included in the data analysis. A sample size of 150 is acceptable for using structural equations modelling, although structural equations modelling assumes that the larger the sample size, the more accurate the model estimation and the more trustworthy the results (MacKinnon and Dwyer, 1993; Loehlin, 1992; Anderson and Gerbing, 1984). A test of non-response bias is conducted by using the extrapolation method suggested by Armstrong and Overton (1977). No significant difference between early and late responses is observed at the 0.05 level in terms of the key variables. Multivariate normality is also examined and the result shows that the data set is considered not to deviate seriously from normality and so, structural equations modelling using the maximum likelihood estimation method can proceed. The following steps are taken:

(1) Traditional measure of scale (Cronbach's Alpha) and exploratory factor analysis (EFA) are conducted with the intentions of testing the data set's reliability and variables' unidimensionality validity. The results from EFA are used to determine the factor compositions of the constructs.

(2) Measurement models of the constructs are estimated with confirmatory factor analysis to assess the internal consistency of all relevant items. Indicators with low loadings on a factor at non-significant levels are deleted as they do not contribute meaningful value to the construct. The indicators are then transformed into composite

scores to represent their corresponding first order latent variables (like observed variables at this stage) to estimate the measurement models at the second order level (Lai, 1999; Rowe, 2006); these models are discussed below.

External Environment (EE) Measurement Model

The results of reliability testing (Cronbach's Alpha) show that the reliability in measuring EE with a 4-dimensional structure (i.e. ES, EM, IM, and IC) is acceptable (alpha > 0.7). However, the correlation between the two items underlying EM (C13: external resource is abundant, and C14: external environment is generally good) is 0.635, and t = -0.31, $p = 0.757$, indicating that these two items are not significantly different from each other, but are highly correlated with a high potential of multicollinearity, yielding an improper solution for the measurement model. Moreover, testing a complex construct through only two items appears to suffer from the potential risk of low reliability, and the low reliability is confirmed by the model estimation result, as C14 imposes no significant loading on EM ($p = 0.104 > 0.05$). Therefore, EM is excluded from the final structural equations model. Furthermore, the estimation results show that IC and IM are highly correlated ($R = 0.55$, $p < 0.001$), suggesting that they both measure how competitive the industry environment is and should be under the same dimension, as suggested by theory. The results indicate that EE is a complex, multi-dimensional construct; there does not exist a single latent variable explaining all the dimensional factors, as correlations between all the four factors are very low and not significant ($p > 0.05$). Therefore, the first order factors cannot load further on one single construct, EE. Two dimensions, ES and IC, are

retained to reflect environment stability and industry monopolism (competitiveness) of EE, as shown in Figure 6 (a) & (b).

Figure 6 about here

Resources and Competences (R&C) Measurement Model

As described earlier, two-order confirmatory factor analysis is used to estimate an R&C measurement model. The composite scores of the first order factors, PhyR, FinR, HumR, and IntR for resources and FunC, EBS, and IMC for competences, are computed by multiplying the observed item scores by their proportionally weighted factor regression coefficients; they then constitute the factors to be included in the second order confirmatory factor analysis. The measurement model of R&C with FinR and FunC correlated is estimated. According to the estimations, both FinR and FunC interpret their outcome factors at a significant level. However, FinR and FunC have an extremely strong correlation ($r = 1.00$), suggesting that there is no distinctive measurement difference between these two constructs; in other words, it is not possible to differentiate FinR from FunC in terms of their ability in predicting the first order factors. Due to such high correlation, it is not meaningful to separate FinR from FunC, and thus, all factors load on the same underlying construct, R&C, as shown in Figure 6(c).

Organisational Performance (OrgPer) Measurement Model

The reliability coefficient of the five indicators under OrgPer is 0.905, indicating that the results obtained using these indicators to measure OrgPer are highly consistent and reliable. Item-total correlations for the five indicators range from 0.672 to 0.857, which suggests that the relationship of the indicators with the latent variable, OrgPer, is strong and that unidimensionality of the construct is satisfied. In the confirmatory factor analysis, the five indicators load on the *a priori* latent variable, OrgPer (refer to Figure 6(d)).

The goodness-of-fit indices in Table 4 indicate that all the measurement models, i.e. ES, InE, R&C, and OrgPer provide adequate fit to the data collected and demonstrate strong evidence of construct validity. Traditional measures (through SPSS) and confirmatory factor analysis (through AMOS) cross-validate the results, showing that all the latent constructs and their measurement are valid and reliable.

Table 4 about here

Estimation of the Structural Equations Model

The three piecewise measurement models of OrgPer, EE (including ES and InE), and R&C are connected to form the structural model that specifies the hypothesized relationships among the four measurement models. The postulated causal relationships (also called "paths") among the research constructs in the hypothesized model are grounded in theory, as shown in Figure 7. In this path model, organisational performance (OrgPer), the dependent variable, is at the centre. The independent variables comprise environment stability (ES), industry environment

(InE), and firm resources and competences (R&C). R&C exerts a direct influence on OrgPer, while both ES and InE impose direct influence on OrgPer as well as indirect influence on the dependent variable through affecting R&C first (a mediation relationship). Parameter estimation and selected goodness-of-fit statistics related to the hypothesized model are also presented in the figure. The χ^2 test indicates that the model does not satisfy a perfect fit, but χ^2 test provides little guidance in determining the extent to which the model does not fit (Bryne, 2001). Other indices, however, such as goodness of fit index (GFI) (Jöreskog and Sörbom, 1993), comparative fit index (CFI) (Bentler, 1990, 1992), and root mean square error of approximation (RMSEA) (MacCallum, Browne and Sugawara, 1996), can provide useful evidence in this respect. GFI (0.905), CFI (0.934), and RMSEA all suggest that the model secures a mediocre fit. Additionally, considering the relatively small sample size and the complexity of the model, such a model fit is acceptable, and the proposed model is, thus, considered to account for the variability observed in the data.

Figure 7 about here

The path coefficients among higher order constructs are all significantly different from zero, except for the path: ES → OrgPer, which has a path coefficient of -0.066 (c.r. = 0.773; p = 0.439). For InE → OrgPer, the standardized regression weight is 0.31, and significant (c.r. = 2.594; p = 0.011). The influences on resources and competences from ES and InE are also significant with their values at -0.313 and 0.354 respectively. The strongest effect on OrgPer is imposed by R&C, which is 0.49 with $p < 0.001$. Although a correlation of 0.16 exists between ES and InE, the c.r. (1.408 <1.96) and p value (0.159 > 0.05) indicate that it is not significant.

DISCUSSION OF RESULTS

Testing of Hypotheses

The hypotheses focus on the relationships amongst organisational performance, external environment, and internal resources and competences. Each hypothesis is tested using the t-value, i.e. c.r. > 1.96, of the relevant structural coefficient (standardized regression weight), with a significance test set at 0.05.

H 1: *Both internal resources and competences contribute positively to a construction SOE's organisational performance*. This hypothesis states that better resources and stronger competences lead to superior organisational performance. This hypothesis is corroborated by the high and positive standardized path coefficient from R&C to OrgPer ($\gamma = 0.49$, c.r. = 4.69, $p < 0.001$), as shown in Figure 6.

H 2: *External environment is an important determinant of the organisational performance for construction SOEs*. As external environment is a multidimensional construct, its impact on organisational performance differs among its various dimensions. As the framework demonstrates, four important dimensions underlying external environment are introduced to this empirical study, namely environment stability, environment munificence, industry competitiveness, and industry monopolism. Thus, sub-hypotheses derived from H2 are tested as below:

H 2.1 *The more stable is a firm's external environment, the better is its organisational performance*. This hypothesis is not supported by the results, as the ES impose no significant effect on OrgPer. Interestingly, it exerts a significant but negative (-0.31) impact on firm's resources and competences, indicating that a construction SOE would have better resources and stronger competences in a less stable external environment.

H 2.2 *The environment munificence affects a construction SOE's performance positively*, namely, the firm performs better in a more munificent external environment. This hypothesis could not be tested as the construct, EM, was dropped out before being introduced into the final path model due to low reliability with its measurement.

H 2.3 *The industry competitiveness (IC) affects the organisational performance of a construction SOE inversely*. This hypothesis is supported by the significant regression weight of InE on OrgPer (0.31) in association with the positive loadings from C18 and C21 (0.31 and 0.28), which both measure the industry competitiveness.

H 2.4 *The industry monopolism (IM) affects positively the organisational performance of a construction SOE*, namely, when a construction SOE holds a more monopolistic position in the industry (sector), it delivers higher organisational performance. This hypothesis is supported as well, for the regression coefficient between InE and OrgPer is significant (0.31) and C19 and C20, which are the two items measuring IM, provide very high, significant, and positive loadings (0.88 and 0.64 respectively) on InE.

H 3: *In comparison, internal resources and competences play a more important role in determining a construction SOE's organisational performance than the external environment does*. This hypothesis is also supported by comparing the path coefficient of R&C to that of ES and InE on organisational performance. With the two paths from ES and InE to R&C removed, the path coefficient of R&C on OrgPer is 0.53 (c.r. = 5.3, $p < 0.001$), while that of ES on OrgPer is only -0.08 and not significant either, so its influence can be neglected, and that of InE on OrgPer is 0.33 and also significant (c.r. = 2.7, $p < 0.05$). However, comparing to R&C's impact on organisational performance, the influences of InE and ES are much weaker.

Dynamism in the environment

Whilst a firm may identify and establish organisational competences and capabilities, it is essential that those are treated as continuously evolving. Thus, in the context of countries such as China, the dynamics are even more important and complex as, due to, *inter alia*, revisions in legislation and other environmental systemic step-changes, an amalgam of various dynamics applies. Such dynamics generate requirements for continuous environmental scanning and responses plus organisational learning. Organisational flexibility is vital to avoid an era's core competences/capabilities becoming core rigidities.

Much literature (Fiol, 2001) asserts the dynamic leadership of markets (the temporal leadership of demand over supply), to which firms must respond and so, supports the I/O approach of organisational response to environment. That perspective lends

credence to the importance of organisational learning and the consequent imperative of flexibility which leads Adner and Helfat (2003) to propose that dynamic managerial capabilities are dependent upon managerial human capital, managerial social capital and managerial cognition. Hence, it seems that the 'traditional' notion of static equilibrium is redundant and being replaced with the more appropriate, but significantly more complex, notion of dynamic (or statistical) equilibrium (see, Bowles, 2004); with further extensions in complexity theory (see, Boisot and Child, 1999).

Trompenaars and Hampden-Turner (1997) examine peoples' perceptions of time and, thence, how to manage time. They demonstrate that different (national) cultures view the relative importance of different time periods (past, present and future) to be of different importance and impact on decisions and that there are varying relationships between the time periods (p127) – from considerable overlap to absolute separation. For strategic management, such perspectives on time are exacerbated by the cultural dimension of long-termism – short-termism (see, Hofstede, 2001; The Chinese Culture Connection, 1987). Trompenaars and Hampden-Turner (1997:128, 129) note national quantifications of average time horizons for long-termism – short-termism as well as past and future; China scores long time horizons in all three cases and with the periods regarded as distinct. Finally, they examine synchronic and sequential planning and managerial approaches and conclude that "There is accumulating evidence that sequential planning processes work less well in turbulent environments" (p136), which should bode well for Chinese strategic planners who, characteristically, adopt a synchronic approach.

Over a history of some five thousand years of civilisation, China is characterised as adopting a long term perspective whilst comprising distinct era (dynasties). That is in notable contrast to most Western societies which pursue short term objectives with history more of a continuum of developments. Thus, Western-determined market theories of organisational strategy and the performance metrics for success are unlikely to be directly applicable to the Chinese context – it is not only the transitory nature of the Chinese construction industry which explains the relatively poor performance evident from table 1 but likely to be related to a long term developmental/learning perspective (with a strong collectivist orientation) in moving into the global market.

Limitations

This study, as with all others which endeavour to examine changes over time, suffers from methodological shortcomings. Ethnographic, longitudinal studies include issues of perceptions, series of cross-sectional studies include issues of repeated data collections; this study's questionnaire approach contains the issues of questionnaire design and sampling as well as respondent behaviour. The precaution included of piloting for suitability of content, testing between early and later responses, etc., and use of case studies (interviews and archival examinations) combine to enhance validity and reliability. SEM is adopted as an acknowledged and robust method for analyses of the data, constructs and relationships; however, the size of sample is at the lower end of acceptability for the method.

Clearly, a more extensive study – perhaps a coordinated series of studies – across a broader spectrum of construction organisations (doth domestic and foreign) operating

in China should prove revealing of further insights. Usefully, such studies would include ethnographic methods together with longitudinal analysis of archival data.

However, a particular set of issues arises due to the location of the study and recent history of China. Chinese , like many others, tend to be wary of outsiders (especially, non-Chinese); China has many languages and dialects making fluency in Putonghua very important (including the contextual nature of the language). Such barriers to data gathering must be overcome as well as the problems due to the extent and questionable accuracies of any archival records which can be obtained. In short, contacts and *guanxi* remains very important for securing data and so, inevitably, impacts on the research design and sampling.

In the last 20 years, RBV has been widely adopted in strategy research, in particular, for the strategic behaviour implemented by managers and the outcome in terms of competitive advantage and organisational performance. Wernerfelt (1984) views the firm as a collection of assets or resources which are tied 'semi-permanently' to the firm and according to Teece et al (1997), some of these assets are fully appropriable by the firm (e.g. physical capital or brand names) and others are less tangible assets (e.g. organisational routines and capabilities). There are also dynamic resources (capabilities and learning) and static resources (finite over time). The central tenets of the RBV are path dependence and firm heterogeneity (Lockett, Thompson and Morgenstern, 2009) which, in effect, is a theory relating to "how firms actually operate" as opposed to theories that explain why firms exist (e.g. transaction cost economics).

As Lockett et al (2009:10) point out, “the RBV’s message that firms’ performance differs because of different resource endowments is probably incapable of falsification”. However, the limitations of the RBV, as discussed by Lockett et al (2009), including potential tautology, problems of resource identification, organisational heterogeneity, organisational size, definition of competitive advantage, cross-sectional methods, and hypothesis specification and measurement of variables are acknowledged.

The tautological issues have been addressed in the research design, as have those of resource identification; conducting the study on large SOEs in China (according to governmental classification) yield some commonality of context; hypotheses have been established and tested using well-established variables, especially regarding organisational performance. However, concerns over temporal robustness due to the cross-sectional nature of the study remain.

CONCLUSIONS

The results from this empirical study demonstrate that both external environment and firms’ resources and competences are important determinants of organisational performance for China’s large construction SOEs. However, such firms’ internal resources and competences are more critical in determining organisational performance. In the external environment, environmental stability has no direct impact on organisational performance, but influences firms’ resources and competences significantly; industry competitiveness or monopolism imposes direct

impact and indirect (mediating) impact on organisational performance through affecting a firm's resources and competences.

Both resources and competences inside a firm contribute significantly to organisational performance. However, compared to resources and competences' impact on organisational performance, the influence of the external environment is much weaker. More importantly, the contributions from different categories of resources and competences to organisational performance are also identified, i.e. physical resources (0.29), financial resources (0.29), human resources (0.4), intangible resources (0.38), functional competences (0.42), external boundary spanning (0.35), internal management system (0.34) (the figures in the brackets are the regression coefficients calculated by multiplying the relevant factor's path coefficient with each indicator's loading into this factor).

These findings provide a useful guide for managers of construction SOEs in deciding what resources and competences should be developed within their enterprises. In particular, the human factors of managing people, boundary spanning and ensuring (technical) functional competence are essential for good organisational performance. Construction SOEs should pay attention to a portfolio of resources and competences rather than relying on only a single or a few "core competences", in order to deliver high organisational performance. Despite its indirect effect on organisational performance, forward-looking environmental scanning is vital to determine appropriate directions and resourcing requirements for firms in the rapidly evolving construction market in China; in no small measure, because the changing environment dictates the performance metrics and levels demanded.

Thus, it is important for firms to acknowledge the portfolio of resources and competences which impact on organisational performance, rather than focussing on one, or a few 'core competences'. The forward-looking environmental scanning is important, not only for the usual purpose of detecting workload opportunities but also for evolution of requisite performance metrics and means of addressing those. In the continuing transition to a market economy (with Chinese characteristics), financial management is the emerging, vital competence, followed closely by market image/reputation and management of people, both externally and internally.

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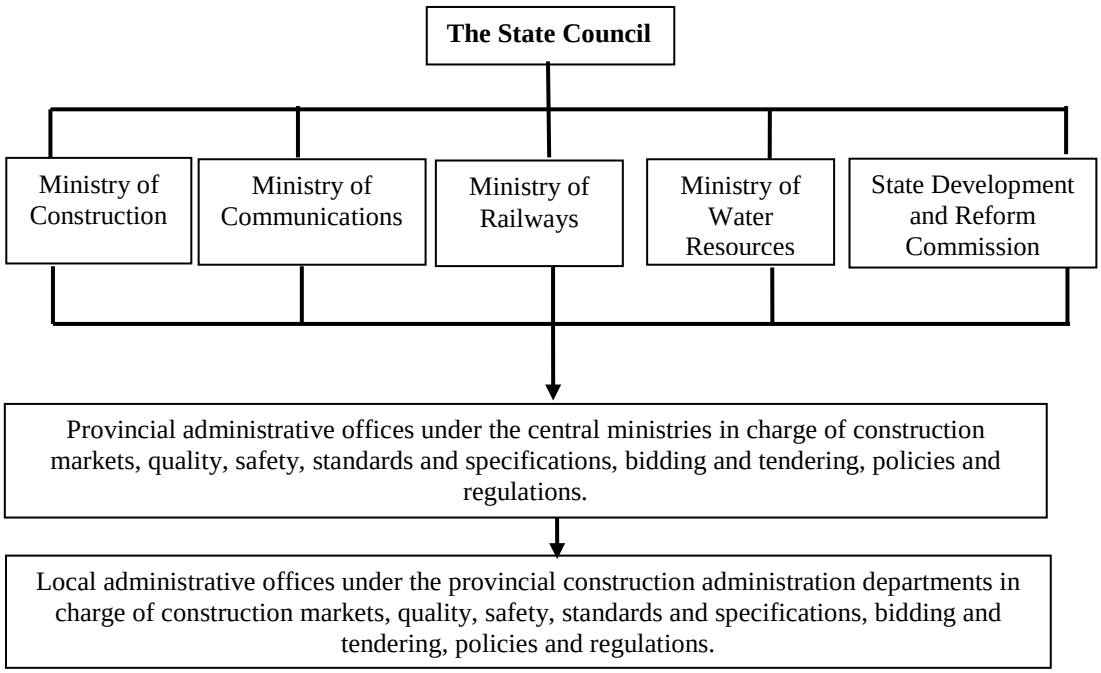


Figure 1: Current Construction Administration System in China
(Developed from CEI, 2005: 22.)

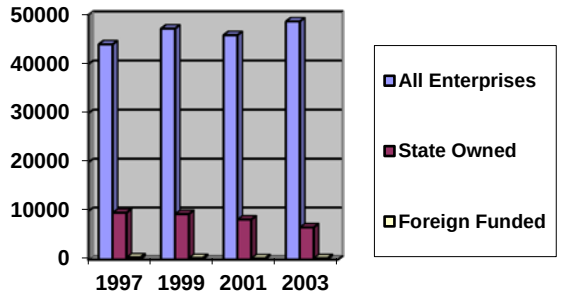


Figure 2 (a): Number of Construction Enterprises

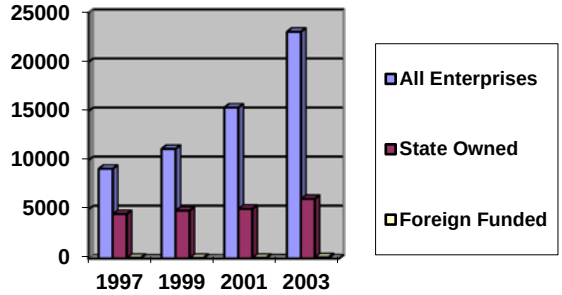


Figure 2 (b): Gross Output Value (100 million yuan)

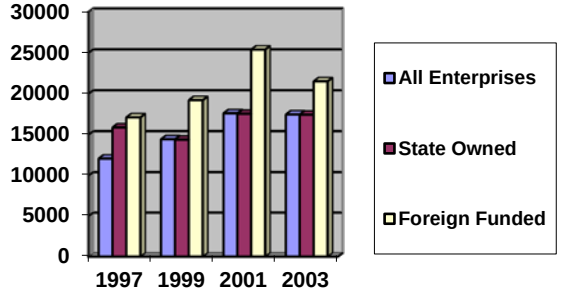


Figure 2 (c): Productivity – Value Added (yuan) per Person

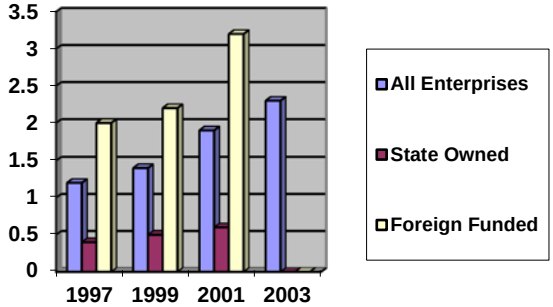


Figure 2 (d): Profitability – Profit to Gross Output Value (%)

Figure 2: Number and performance indicators of construction enterprises in China
(Sources: National Bureau of Statistics of China, *China Statistical Yearbook 1997, 1999, 2001, 2003*, Beijing: China Statistics Press)

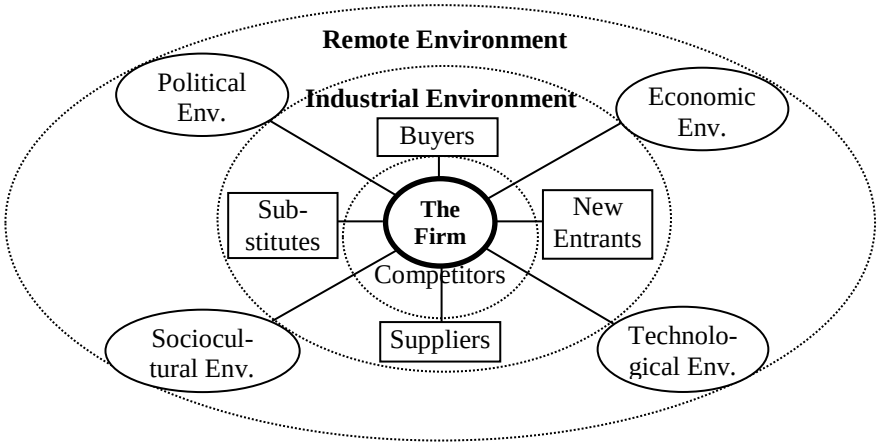


Figure 3: Environment Analysis Model
(Adapted from Wit and Meyer, 2005; Fitzroy and Hulbert, 2005)

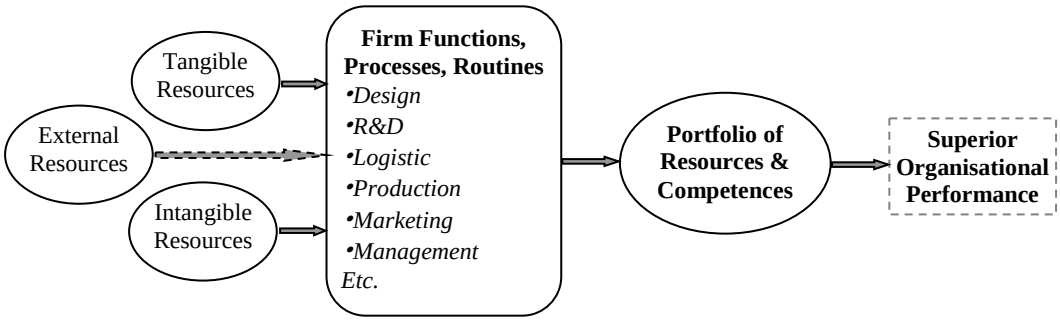


Figure 5: Construction of a Competence-based Model
(Adapted from Hafeez et al., 2002)

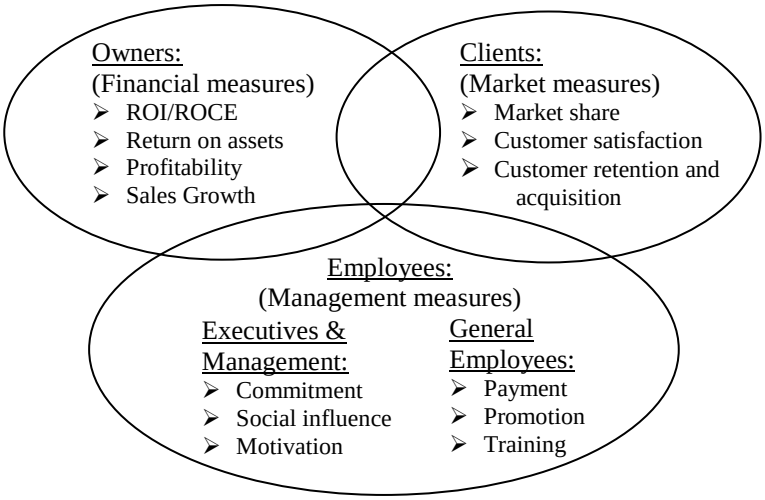
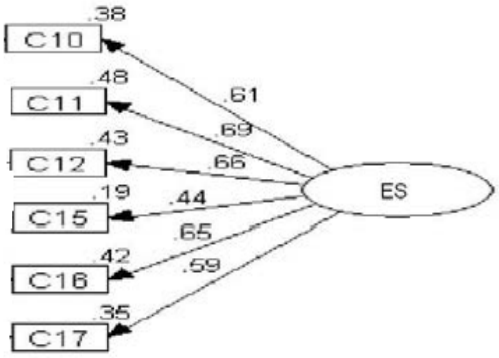
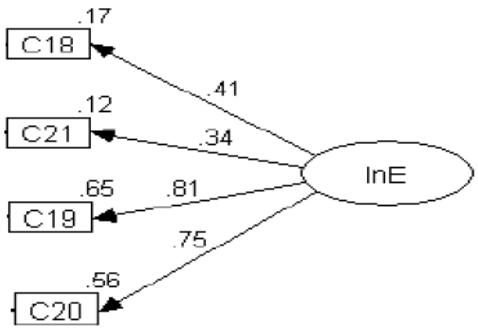


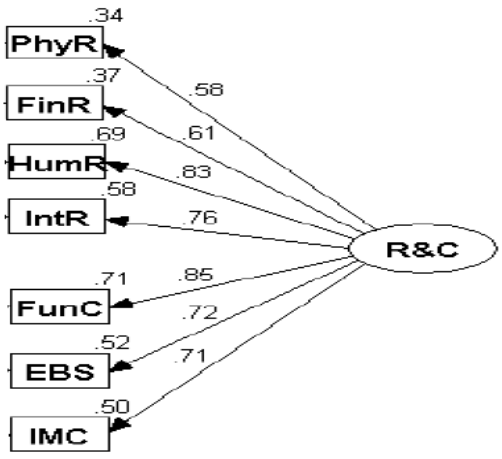
Figure 4: A Stakeholder Approach to Organisational Performance
(Adapted from Fitzroy and Hulbert, 2005; Bao, 2004)
Legend: ROI (return on investment); ROCE (return on capital employed)



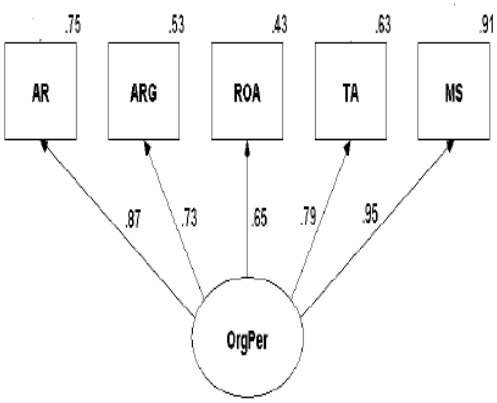
(a) Environment Stability (ES)



(b) Industry Monopolism/Competitiveness (InE)



(c) Resources and Competences (R&C)



(d) Organisational Performance (OrgPer)

Refer to Appendix 1 for the key to variables

Figure 6: Measurement Models

Figure 7 Renumbered from 6

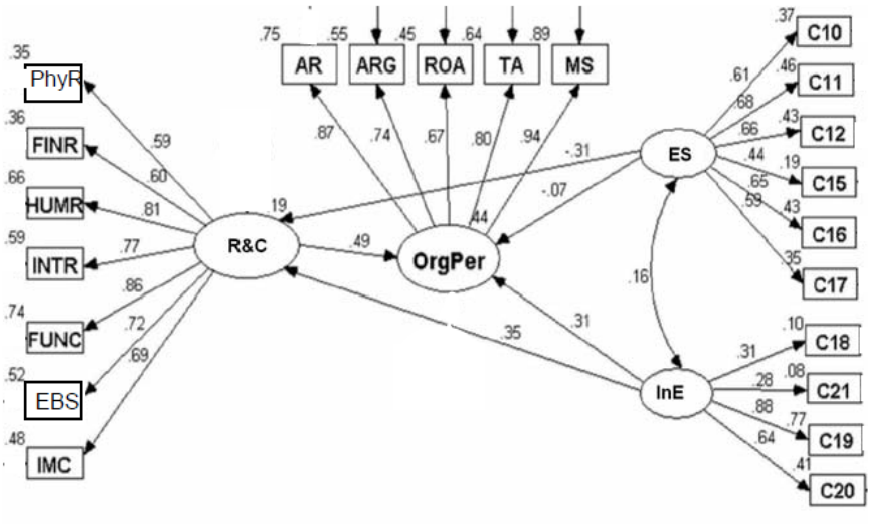


Figure 6: Standardized Estimation of the Structural Equation Model
Model goodness-of-fit indices: χ^2 =342.451, df = 201, p-value < 0.001;
GFI = 0.905; CFI = 0.934; TLI=0.901; RMSEA = 0.069 (lo 90: 0.056; hi 90: 0.081).
Refer to Appendix 1 for the key to variables

Table 1: Some main indicators of construction enterprises

14-1 Main Indicators on Construction Enterprises

Year	Total	State-owned	Collective-owned	Funded from Hong Kong, Macao and Taiwan	Foreign Funded	Others
Number of Enterprises						
1980	6604	1996	4608			
1985	11150	3385	7765			
1990	13327	4275	9052			
1995	24133	7531	15348	329	312	613
1996	41364	9109	29044	417	388	2406
1997	44017	9650	29872	491	454	3550
1998	45634	9458	28410	629	337	6800
1999	47234	9394	27197	664	341	9638
2000	47518	9030	24756	635	319	12778
2001	45893	8264	19096	622	274	17637
2002	47820	7536	13177	632	279	26196
2003	48688	6638	10425	535	287	30803
2004	59018	6513	8959	511	386	42649
2005	58750	6007	8090	516	388	43749
2006	60166	5555	7051	479	370	46711
2007	62074	5319	6614	482	365	49294
Number of Persons Employed (100 000 persons)						
1980	648.0	481.8	166.2			
1985	911.5	576.7	334.8			
1990	1010.7	621.0	389.7			
1995	1497.9	824.3	631.9	5.0	5.4	31.3
1996	2121.9	855.9	1171.4	8.7	8.6	77.3
1997	2101.5	828.6	1148.2	8.2	9.6	106.9
1998	2030.0	738.4	1057.3	9.3	5.1	219.9
1999	2020.1	690.6	993.1	11.5	6.1	318.9
2000	1994.3	635.6	887.5	8.2	4.4	458.6

2001	2110.7	590.7	739.9	7.7	4.3	768.1
2002	2245.2	543.8	579.2	7.4	4.5	1110.4
2003	2414.3	524.3	505.6	7.0	6.0	1371.3
2004	2500.3	467.4	386.4	6.8	8.1	1631.6
2005	2699.9	480.0	361.6	8.6	10.8	1838.9
2006	2878.2	467.6	332.0	8.9	8.1	2061.6
2007	3133.7	470.1	317.0	9.8	11.4	2325.4

Gross Output Value
(100 million yuan)

1980	286.93	220.90	66.03			
1985	675.10	474.51	200.59			
1990	1345.01	935.19	409.82			
1995	5793.75	3670.25	1899.47	33.60	33.19	157.24
1996	8282.25	4160.21	3695.68	46.85	50.51	329.00
1997	9126.48	4526.52	3925.81	63.72	70.49	539.94
1998	10061.99	4571.44	4012.01	91.94	62.52	1324.08
1999	11152.86	4861.38	4081.79	91.97	64.43	2053.29
2000	12497.60	5053.79	4035.84	99.18	67.49	3241.30
2001	15361.56	5362.81	3775.89	102.55	73.06	6047.25
2002	18527.18	5582.86	3338.50	113.87	91.38	9400.57
2003	23083.87	6060.23	3270.73	123.71	129.39	13499.81
2004	29021.45	7325.61	2756.12	137.03	202.46	18600.23
2005	34552.10	8432.03	2815.20	172.54	249.03	22883.30
2006	41557.16	9218.56	2904.48	240.52	274.87	28918.73
2007	51043.71	10630.90	3153.65	281.95	396.32	36580.89

a) Data from 1980 to 1992 are the figures of State-owned and collective-owned construction enterprises. Data from 1993 to 1995 are the figures of construction enterprises of all economic types above town level. Data from 1996 to 2001 included construction enterprises at fourth or higher quality grades(old classification of grades). Data since 2002 included all general construction contractors and professional contractors (not including construction enterprises of worker subcontractors) which possess qualification grades.

b) For 1993-1997, the number of employed persons refers to the annual average.

http://www.stats.gov.cn/tjsj/ndsj/2008/indexeh.htm - China Statistical Yearbook 2008 (visited 26 March 2010)

Table 2: Size Classification of Construction Enterprises
(Source: NBS, 2003)

Size Classification of Enterprise	**Employment (No of Persons)**	**Sales (million RMB)**	**Total Assets (million RMB)**
Large	>2999	>299	>399
Medium	600 – 2999	30 – 299	40 – 399
Small	<600	<30	<40

Table3: Dimensions and Measurements of Firm Resources and Competences (Adapted from McDermott, 2003) – see Appendix for the question items

Dimensions of Resources and Competences		Indicators and Nos. of Question Items
Firm Resources (FR)		Physical resources (PhyR – 3 items)
		Financial resources (FinR – 3 items)
		Human resources (HumR – 4 items)
		Intangible resources (IntR – 5 items)
Firm's Competences (FC)	Functional Competences (FunC)	Functional Competences (FunC – 8 items)
	Integrative Competences (IntC)	External Boundary Spanning (EBS – 6 items)
		Internal Management Competences (IMC – 11 items)

Table 4: Summary of Estimation Goodness-of-Fit Indices of Measurement Models

Measurement	χ^2 test			GFI	AGFI	CFI	TLI	RMSEA
Model	χ^2	*df*	*p*	>0.95	>0.9	>0.95	>0.95	<0.07
ES	16.058	9	0.066	0.964	0.917	0.964	0.973	0.07
InE	0.001	1	0.971	1	1	1	1.049	0
R&C	20.283	13	0.088	0.966	0.927	0.986	0.978	0.06
OrgPer	0.768	3	0.857	0.998	0.99	1	1.014	0

Legend: ES – environmental stability; InE – industry monopolism/competitiveness; R&C – resources and competences; OrgPer – organisational performance; GFI – goodness of fit index; AGFI – adjusted goodness of fit index; CFI – comparative fit index; TLI –Tucker-Lewis Index; RMSEA - root mean square error of approximation

APPDENDIX
(Cronbach Alpha given in parenthesis)

RESOURCES AND COMPETENCES (R&C)		
Firm Resources		
PhyR (0.737)	Physical	Plant and equipment Other fixed assets Overall physical resources
FinR (0.846)	Financial	Liquidity Financing tools or approaches Overall financial resources
HumR (0.757)	Human	Executives and management Engineers and technicians Operatives Overall human resources
IntR (0.871)	Intangible	Technology Firm's qualifications Firm's structure Firm's brand and reputation Overall intangible resources
Firm Competences		
FunC (0.882)	Functional	Project management capability Construction capability Engineering capability R&D or technology innovation capability Financial management capability Marketing capability Human resource management capability Overall functional capabilities
EBS (0.893)	External boundary spanning	External physical resources (materials, equipment, finance, personnel etc.) acquisition capability External information and knowledge acquisition capability (scanning, filtering and acquiring valuable information) Building and maintaining good relationship with government authorities Building and maintaining good relationship with clients Building and maintaining good relationship with suppliers and subcontractors Firm's overall external boundary spanning capability
IMC (0.929)	Internal Management Competences	Efficient and effective information exchange between hierarchies (vertical information communication system) Scanning and filtering the internal environment for ideas/expertise and other pertinent information Top executives' vision and leadership Sufficient information exchange across functional, disciplinary or technical boundaries (lateral information communications system) Scanning the internal environment for threats and crisis Organisational learning capability Knowledge management system Organisational processes and routines

		Building harmonious relationships inside the firm and groups Lateral teambuilding Overall internal boundary spanning capability and the efficiency of the overall management system
EXTERNAL ENVIRONMENT (EE)		
ES (0.776)	Environmental stability	Industry is changing much (reverse question) (C17) Know if the change is good for us (C11) Know how to act to deal with the change (C12) External environment is stable (C15) External environment not changing fast (C16) Know well about the external changes (C10)
InE	Industry Monopolism/ competitiveness	
Industry Monopolism (IM) (0.745)		Our firm holds monopolistic position in the industry (C19) No threat from new entrants due to industrial obstacles (C20)
Industry Competitiveness (IC) (0.645)		The industry is not a seller's market (C18) Construction industry is not competitive (C21)
ORGANISATIONAL PERFORMANCE (OrgPer)		
AR		Annual turnover
ARG		Annual revenue growth
ROA		Return on total assets
TA		Total assets
MS		Market share
FURTHER ABBREVIATIONS		
EM		Environment munificence
I/O		Industrial/organisational
RBV		Resource-based view
SOEs		State-owned enterprises
GFI		goodness of fit index
AGFI		adjusted goodness of fit index
CFI		comparative fit index
TLI		Tucker-Lewis Index
RMSEA		Root mean square error of approximation