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The Role of Human Resource Practices in Enhancing Employees' Behaviours and Organisational Learning in Chinese Construction Organisations

by

Xiaofeng ZHAI

Doctoral Thesis

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Supervisor: Prof. Anita M.M. LIU

Abstract

Construction is complex and comprises a multitude of knowledge-driven activities and business interests from participating organisations with the people involved being subject to different organisational and disciplinary practices. People are fundamental to success because human capabilities in learning, innovating and changing creative directions are vital to long term development of organisations. In the last two decades, researchers have found that human resource (HR) management has positive effects on the organisational performance. However, the processes through which HR management lead to organisational performance are contested. This research proposes a framework to investigate the effects of employees' behaviours and organisational learning on organisational performance and the impacts of HR practices on those effects in the context of Chinese construction enterprises.

The research design adopts a multi-method approach, integrating positivism and interpretivism, to understand the complex relationship between HR practices, organisational learning, individual behaviour, and organisational performance. By consulting two experienced academic researchers and industry experts, the pilot study improves the understanding and implementation of the measurement instruments employed. Both quantitative and qualitative approaches are adopted in data collection and analysis: 326 valid respondents through questionnaire survey are received, and structural equation modelling is adopted to test individual behaviour and organisational learning as mediating variables of the relationship between HR practices and organisational performance respectively. Middle-level managers in Chinese construction firms are interviewed, and a cognitive map is produced to reveal the possible mediating variables and the cause-effect relationships between organisational learning and individual behaviour. The cause-effect route identified from the cognitive map is tested by structural equation modelling method, i.e., individual in-role behaviour as a mediating variable between organisational learning and performance.

In conclusion, from the theoretical perspective, the results reveal the following. (1) Individual in-role behaviour has highly significantly positive effect on organisational performance. Organisational learning has very highly significantly positive effect on organisational performance. Both individual in-role behaviour and organisational learning have mediating effects on the relationship between HR practices and organisational performance. (2) HR practices positively affect individual in-role behaviour indirectly

through organisational learning. Individual in-role behaviour mediates the relationship between organisational learning and organisational performance. (3) HR practices also affect organisational performance via the path-way of social capital, individual perceived organisational support, organisational citizenship behaviour (OCB), and co-worker productivity.

For the practical implications, Chinese construction companies should implement the following to improve organisational performance. (1) Recognize the importance of employees' in-role behaviour, and design HR practices to motivate employees to apply their knowledge, skills and abilities in job-related performance, and to retain qualified and experienced staff. (2) View organisational learning as an important component of competitive advantage in the process of organisational development, and motivate and enhance organisational learning by the employment of HR practices and the creation of social capital. (3) Recognize the importance of OCBI (i.e. organisational citizenship behaviour directed toward the benefit of other individuals), and try to elicit employees' OCBI by improving employees' perceived organisational support.

Keywords: HR practices, individual in-role behaviour, organisational citizenship behaviour, organisational learning, organisational performance

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Acronyms

HR	Human Resource
OCB	Organisational Citizenship Behaviour
OCBI	Organisational Citizenship Behaviour directed toward the benefit of other Individuals
OCBO	Organisational Citizenship Behaviour directed toward the benefit of the Organisation
SOEs	State-Owned Enterprises

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Chapter 1 Introduction

1.1 Research problems

In China, construction is one of the industries underpinning the economy. Statistics shows that the turnover of construction industry has rapidly increased by 276% from year 2000 to 2005, which are £100 billion and £278 billion respectively.

Simultaneously, the total number of various construction enterprises increased from 47,518 to 58,750 (National Bureau of Statistics of China, 2006a).

Chinese construction enterprises have gained experience in various types of projects in an evolving competitive environment over the 30 years of economic transformation to a market-based socialist economy. Currently, there are 50 Chinese construction enterprises on the list of top 225 international contractors (Engineering News Record 2009). However, significant gap between Chinese construction companies and international counterparts still exists (Zhou, Fang and Chen, 2009), according to their interview investigation with 12 high level managers from Chinese state-owned construction enterprises. Han (2004) analyses the weaknesses for Chinese construction firms in the international construction market, i.e. their bureaucratic organizational structure, low quality of project management, poor financial ability, and lack of experienced overseas project managers. In particular, Zhao and Shen (2008) have recognized 'lack of well-trained human resources' as one of the weaknesses when Chinese contractors compete in the international market. According to China Statistical Yearbook, Cheah, et al. (2007) have calculated the average profitability level of Chinese construction companies from 1997 to 2002, and found that the after-tax profit margin is only about 1.5%.

Nowadays, Chinese construction companies have improved their technology and technical methods employed in construction. The 'soft' management, however, is still a bottleneck in the development of Chinese construction companies. The main problems concerning the management of human resources have been highlighted as

follows (Huang, 2004; Lai, et al., 2005; Ma, 2005; Song, 2004; Zeng, 2004; Zhang, et al., 2004):

- Static personnel management: because there are lacks of professional human resource employees in construction firms, a dynamic human resource plan is required to satisfy the development need of the company.
- High employee turnover: employees frequently quit jobs when they earn experience through work but their rewards are not increased by the managers.
- Inflexible job arrangement: the companies cannot arrange employees efficiently, e.g. in the bidding process, the bidding team is in short of commercial and technical engineers, but number of qualified employees is over arranged in other positions.
- Lack of efficient motivating reward policy: the employees perceive that there is no difference in reward no matter how hard they work, so they do their job in negative attitude, which, in turn, may reduce their productivity.
- Lack of fairness in promotion: there is lack of objective performance appraisal method.
- Low effective training program: compared with Japanese and Western countries, Chinese construction companies spend little efforts in training.

Based on the problems mentioned above, firms have increasingly recognised the potential for their employees to be a source of competitive advantage (Pfeffer, 1994; Wright, et al., 2003). The construction industry is project-based. Construction enterprises need to deploy qualified staff (project manager, various engineers, financial employees, foreman, etc.) in different departments during project realisation; HR management is vital for project success and organizational performance (Loosemore, Dainty and Lingard, 2003). The question of how to create competitive advantage through human resource (HR) requires careful attention to the practices, e.g. attracting, training, motivating and developing employees with critical skills and aptitudes.

Notions of HR management differ significantly between countries. Thus, adoption of HR management is also varied- greatest in USA and UK and unknown in other

countries (e.g. Iran) with an array between those extremes (Tayeb, 2001). Before the 1990s, HR management in China lacked emphasis and, often, was no more than personnel management and administration (Ahlstrom, et al., 2005). Usually, graduates were assigned to the enterprises which secured the lifelong job; their task was to help solving staff's personal problems, e.g. housing, child education, and retirement. Following the economic transformation and the foreign firms' investment in China's market, especially after World Trade Organization (WTO) entry in 2001, Chinese enterprises recognize the requirement to establish a modern HR policy and practices to support the achievement of organizational strategy in the more competitive and dynamic environment. Current HR practices in Chinese companies include employee selection, staff training, job mobility, job security, employees' appraisal of their performance, rewards, clear and up-to-date job description, and employees' participation in decision making (Sun, et al. 2007; Warner, 2008); these practices also input to strategic decisions.

In the last two decades, Western researchers have found that HR management has positive effect on the organizational performance (e.g. Arthur, 1994; Huselid, 1995; Huselid, et al., 1997; Way, 2002; Guest, et al., 2003; Wright, et al., 2005; Li, et al., 2006; Tseng and Lee, 2009). Theoretically, Huczynski and Buchanan (2001, p.673) define HR management as "a managerial perspective, with theoretical and prescriptive dimensions, which argues for the need to establish an integrated series of personnel policies consistent with organization strategy, thus ensuring quality of working life, high commitment and performance from employees, and organizational effectiveness and competitive advantage".

However, the processes through which HR management lead to organisational performance are contested (Becker and Gerhart, 1996; Bowen and Ostroff, 2004). For example, Collins and Smith (2006) initially explore the potential links as organisational social capital climate and knowledge exchange and combination.

From the organisational role behaviour perspective, the organisation can exist when its employees perform their behaviours and attitudes to satisfy the job requirements. Individual behaviour includes in-role behaviour which is recognized by formal reward systems, and extra-role behaviour which goes beyond role expectations but generally

benefits the organisation (Van Dyne, et al., 1995). One of the best known and most heavily researched extra-role behaviour is organisational citizenship behaviour (OCB), which is distilled by Williams and Anderson (1991) as two dimensions: “(a) OCBO-behaviours that benefit the organization in general and (b) OCBI-behaviours that immediately benefit specific individuals and indirectly through this means contribute to the organization (p.601)”. It is acknowledged that aiming to sustain its competitive advantage, the organisation needs to arouse not only employees’ in-role behaviours (e.g. adopting occupational knowledge and abilities in task related performance), but their extra-role behaviours which go beyond their task requirements (e.g. helping colleagues, being proactive). HR management is the organization’s primary means for sending role information through the organization (i.e. role making process), supporting desired behaviours, and evaluating role performances (Solomon, et al., 1985; Evans and Davis, 2005). For example, empowering employees (like participant in decision making) can motivate their active role behaviours. So, HR practices can contribute to elicit and reinforce employees’ in-role behaviours and motivate extra-role behaviours to provide psychological social environment, which then improve organisational performance.

However, role behaviour perspective cannot tell the whole story about the creation of sustained competitive advantage. Individual behaviours are also determined by environmental stimuli, human volition and internal cognitive processes, and characteristics of observable and transferrable may make individual behaviours easily duplicated (Lado and Wilson, 1994). So, it is necessary to adopt resource-based view to recognise organisational internal resources to create sustained competitive advantage.

As an open system, a Chinese construction SOE interacts with and adapts to its environment, and needs to acquire knowledge within and outside of the organisation to survive and succeed (Cyert and March, 1963). Organizational learning refers to the changes in organizational knowledge that are induced by information processing and that enable an organization to find new ways of surviving and succeeding in new situations (Klimecki and Lassleben, 1998). Based on resource-based view and knowledge-based view, organizational learning is viewed as the capacity or process within an organization to maintain or improve performance based on its experience

and knowledge (Nevis, et al., 1995). Organisational learning is also defined as a dynamic process of knowledge creation, acquisition and integration, which aims at developing the resources and capabilities in the organisation's development (Lopez, et al., 2006). According to Soliman and Spooner (2000), HR practices can facilitate the development of competency, generate tacit organizational knowledge, and may contribute to the capacity of the organization to learn. So, HR practices may have effect on organisational learning, which then contribute to the performance.

Hence, the research AIM is:

To investigate the effects of employees' behaviours and organisational learning on organisational performance and the impacts of human resource practices on those effects.

In order to achieve the research aim, the research context of Chinese construction enterprise is introduced briefly in the next section.

1.2 Background information of Chinese construction enterprises

According to National Bureau of Statistics of China (2006a), enterprises are classified into three categories in China (refer to Figure1-1), namely domestic-funded enterprises, enterprises with investment from Hong Kong, Macao and Taiwan, and enterprises with foreign investment, in the light of the registration status of an enterprise in industrial and commercial administration agencies. Domestic-funded enterprises include state-owned enterprises, collective-owned enterprises, cooperative enterprises, joint ownership enterprises, limited-liability corporations, share-holding corporations Ltd., and private enterprises.

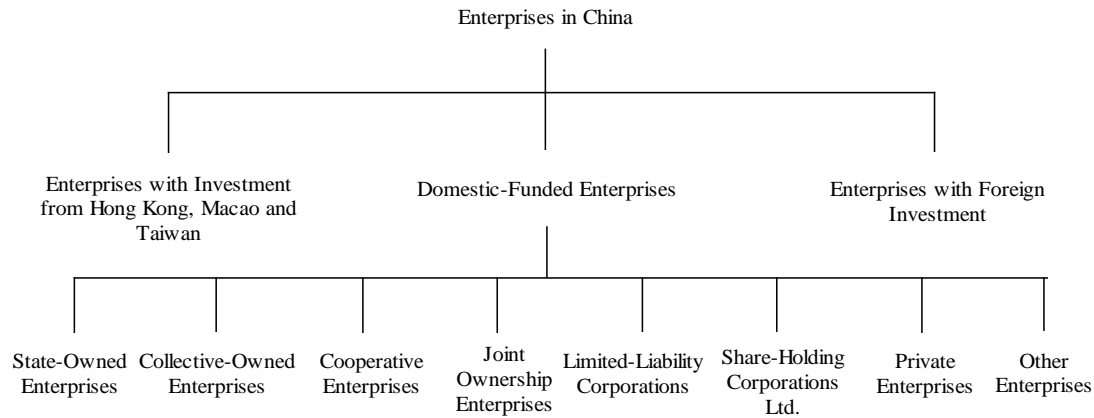


Figure 1- 1: Categories of enterprises in China
(Source: National Bureau of Statistics of China, 2006)

In the process of China's transformation to a market-based socialist economy, some state-owned enterprises have been reformed from traditional state ownership towards a mixed economy characterised by diversified ownership forms (Li, et al., 2005; Wang, *et al.*, 2006). In this study, the firms in China's construction enterprises investigated include state-owned enterprises, sole stated-funded limited liability corporations, and share-holding corporations Ltd. in which the state is the vast majority shareholder. The definitions of these three domestic-funded enterprises by the National Bureau of Statistics of China (2006a, p.53) are explained as follows:

- "State-owned Enterprises refer to no-corporation economic units where the entire assets are owned by the state and which have registered in accordance with the *Regulation of the People's Republic of China on the Management of Registration of Corporate Enterprises (the regulation)*. Excluded from this category are sole state-funded corporations in the limited liability corporations.
- Limited liability Corporations refer to economic units established with investment from 2-50 investors and registered in accordance with *the Regulation*, each investor bearing limited liability to the corporation depending on its share of investment, and the corporation bearing liability to its debt to the maximum of its total assets. Limited liability corporations include exclusive state-funded limited liability corporations and other limited liability corporations.

- Share-holding Corporations Ltd. refer to economic units registered in accordance with *the regulation*, with total registered capitals divided into equal shares and raised through issuing stocks. Each investor bears limited liability to the corporation depending on the holding of shares, and the corporation bears liability to its debt to the maximum of its total assets.”

In the share-holding corporations Ltd., the four essential classes of shares(Hutton, 2006, p.137) are: “(1) state shares owned by the state or its agencies; (2) ‘legal person’ share owned by state-authorized social groups, enterprises, or institutions; (3) individual shares owned by Chinese investors or employees, which can be freely traded by Chinese public investors within China; and (4) foreign shares owned by foreigners, which can be transferred only if the buyer meets state provisions.” The transfer or sale of the share of class (1) and (2) is strictly regulated, and the companies’ fixed assets are controlled by the state actually when the state is the vast majority shareholder. Hence, The Population in this study includes the three categories of enterprises defined by National Bureau of Statistics of China(2006a), which are all investigated and called the widely-defined State Owned Enterprises(SOEs) illustrated in Figure 1-2.

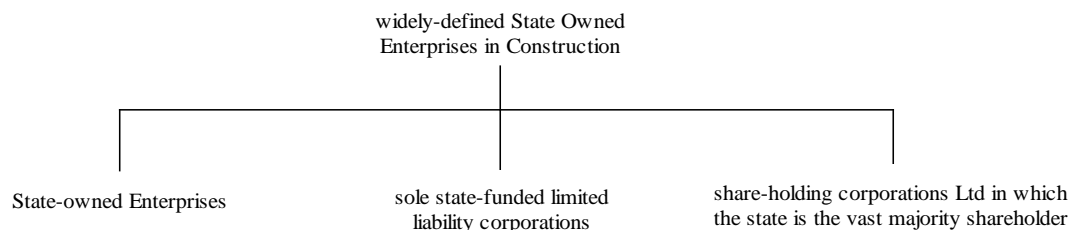


Figure 1- 2: Components of widely-defined Chinese construction SOEs

Additional to the difference of ownership, the Chinese construction enterprises are also categorized by qualifications, size (three categories of small, medium, and large according to the number of employees and total assets), and administration (controlled by central government or local government). Concerning the qualification, according to ‘*Provisions on administration of qualification of construction enterprises (No.87)*’ issued by the Ministry of Housing and Urban-Rural Development of the People’s Republic of China (<http://www.mohurd.gov.cn/>), there are three categories of contractors, i.e., ‘general contractors’ which may construct the whole range of

projects itself, ‘specialized contractors’ which may sign subcontracts with the general contractors to undertake the specialized project(e.g. electronic subcontractor), and ‘labour subcontractors’ which can provide labour service to the main contractor.

1.3 Objectives

Three objectives are developed under the research aim to investigate the effects of organisational learning and employees’ behaviours on organisational performance and the role of human resource practices in enhancing those effects.

Objective 1 is to justify the implementation of construct measurement instruments in the context of Chinese construction SOEs, i.e., the scales used to measure organisational learning, individual behaviour (including in-role behaviour and OCB), HR practices, and organisational performance.

The main constructs’ measurement scales adopted in this study have been developed in Western countries. The implementation of these scales, however, has to be justified before any hypothesis testing as it is necessary to test construct validity to develop valid measurement scales in quantitative studies in the specific context of Chinese construction SOEs (Tsui, 2006). The development of quantitative and qualitative instruments refers to section 4.3 and 4.4 respectively, and the discussion of implementation of the quantitative scales refers to section 5.6 and section 7.1.

Objective 2 is to examine the influences of HR practices on employees’ behaviours and organisational learning.

Based on the resource-based view (see section 2.3), human resource practices can create potential value to improve organizational performance (Arther, 1994; Huselid, 1995; Wright, et al., 2005), but there are few studies regarding the processes through which this value is created (Wright and Gardner, 2002, Purcell, et al., 2003). From organisational role behaviour perspective (see section 2.2, Biddle, 1986; Katz and

Kahn, 1978), individual employees who possess the tacit knowledge to satisfy their task requirements and achieve the project goals are the essential resource of the Chinese construction enterprises. HR practices (e.g. training and intrinsic rewards) may influence and shape individuals' skills, attitudes, and behaviours in task performance to enhance experience and organisational capability. In the model of knowledge-based theory (see section 2.3, Nonaka, 1994; Grant, 1996), the employment of human resource management will improve the ability of organizational learning, which will increase the capability, and in turn may improve the organizational performance. Hence, Objective 2 is to examine the influences of HR practices on employees' behaviours and organisational learning. Refer to section 5.6 and section 7.1 for the findings and discussion regarding the achievement of Objective 2.

Objective 3 is to examine the relationships of employees' behaviours and organisational learning and their impact on organisational performance.

Employees in the Chinese construction SOEs which operate in a rapid changing environment, behave in performance of their roles and functional tasks. And their behaviours, including in-role and extra-role, may be affected by *or* have an impact on organisational learning process in terms of knowledge acquisition, sharing and usage, which, ultimately, affect performance in organisations. There are few studies investigating the relationship between individual behaviour and organisational learning. Hence, the directional relationship between individual behaviour and organisational performance is investigated in qualitative study by cognitive mapping (see Chapter 6); and the mechanisms through which individual behaviour and organisational learning affect performance are also investigated in Chapter 6.

1.4 Organisation of the Thesis

This thesis includes seven chapters. This Chapter briefly introduces the background of the research, including research problems, the research gap, aim and objectives, and the background information of Chinese construction enterprises.

Chapter 2 explains three supporting theories of system theory, organizational role behaviour perspective and resource-based view which guide the researcher to connect main constructs (i.e. HR practices, organisational learning, individual behaviour and organisational performance) and to develop the research framework in Chapter 3.

Chapter 3 further reviews the main constructs first, then develop the research framework which depicts the theoretical connection among the main constructs, considering the effects of environmental forces and organisational internal variables (i.e. strategy, structure, technology, and decision making process) on the formulation of HR strategy and practices, all of which may affect the level of individual behaviour and organisational learning to improve performance.

Chapter 4 postulates two hypotheses. Mixed method (qual-quant) is designed to investigate the effects of individual behaviours and organisational learning on performance, and the role of HR practices to affect these relationships (refer to Figure 4-4 of research map). Data analysis methods of structural equation modelling and causal mapping are also introduced, following the development of quantitative and qualitative scales.

Chapter 5 refers to stage one data analysis, including: (1) to justify the implementation of measurement scales in this research using confirmatory factor analysis; (2) to test the hypothesis H1-a and H1-b using structural equation model. After the quantitative data analysis, the results and findings are discussed.

Chapter 6 refers to stage two data analysis, including: (1) to develop the conceptual causal relationships between main constructs (see HR practices in terms of training and rewards, organisational learning in terms of individual learning and knowledge sharing, in-role behaviour, OCBI, OCBO, and unit performance) using cognitive mapping method, which can cross validate the stage one quantitative findings; (2) to identify the directional causality between organisational learning and individual behaviour to achieve Objective 3; (3) to identify the possible mediating variables which may affect the relationships among main constructs (see social capital, perceived organisational support, and co-worker productivity); (4) and then to test the

qualitative findings in the cognitive map using structural equation modelling method statistically (i.e. Hypothesis 2). The results of stage two data analysis are also discussed.

Chapter 7 concludes the achievement of objectives, and discusses the implications of the findings, research limitations and recommendations for future research.

Chapter 2 Theoretical Conception of Construction Procurement

In order to answer and investigate the inter relationships among HR practices, organisational learning, individual behaviour and organisational performance, appropriate theories are required to be analysed and adopted from beginning of the research, because theories not only guide one researcher to predict what may probably happen given a set of values of certain variables, but also enable he/she to understand why this predicted value should result (Wright and McMahan, 1992). Dubin (1976) describes theory as “the attempt...to model some aspect of the empirical world”. In this chapter, three supporting theories (Jackson and Schuler, 1995) i.e. general system theory, organizational role behaviour perspective, and resource-based view are explained in detail to underpin the research framework developed in Chapter 3.

2.1 General system theory

In general system theory, the unit of analysis is understood as a complex of interdependent parts (Boulding, 1956; Bertalanffy, 1969; Chen and Stroup, 1993; Cleland and King, 1983; Sterman, 2000; Ahmed, 2006). Kast and Rosenzweig (1985) define a system as “an organized, unitary whole composed of two or more interdependent parts, components, or subsystems, and delineated by identifiable boundaries from its environmental supra-system (p.15)”. Further, Ackoff (1969) defines a system as “an entity, conceptual or physical, which consists of interdependent parts. Each of a system’s elements is connected to every other element, directly or indirectly, and no sub-set of elements is unrelated to any other sub-set”.

For a construction project organization, Walker (2002) argues that system theory provides a framework for understanding how the construction procurement process undertakes the tasks required to complete the project within its environment. Liu (1999) applies general system theory to evaluate project outcome from individual cognitive perception perspective. In Liu’s (1999) ‘Goals – Behaviour – Performance - Output’ model to explain the project management process, under environment forces

(e.g. situational constraints), project goal setting is an input element, followed by project participant's goal-directed behaviours and performance in the transformation process; the output includes project participant's perceived project success and satisfaction; and the feedback would affect the participant to set new goals in other projects. The vital points which should be considered in project management (Walker, 2002; Cleland and King, 1983) are the environment, environment forces, differentiation, interdependency, integration, permeability of boundary, and feedback.

Scott (1992) summarizes Boulding's (1956) classification of systems by their levels of complexity. The system types from simple (static) to complex (absolute and the inescapable unknowables) include: framework systems, clockwork system, cybernetic systems, open systems, blueprinted-growth systems, internal-image systems, symbol-processing systems, social systems, and transcendental systems.

Organizations can be viewed as open systems which consist of goals, technological, social structural, participants, and external environment subsystems existing in a state of dynamic interdependence (French and Bell, Jr., 1999). Although organizations have their own characteristics, the basic knowledge about organization can be obtained through studying biological organisms. Such concepts as open and closed system, input-transformation-output-feedback cycle, permeability of boundary, environment and environmental forces, differentiation and integration of subsystems, interdependency, synergy, entropy, and equifinality are useful in understanding organizations, which are explained in the following section.

Open and Closed System

A closed system is one that does not respond to occurrences outside the system; on the contrary, an open system adapts to outside events and occurrences (Walker, 2002). The determination of whether a system is open is the matter of how to define the boundaries of the system. For example, Hall and Fagen (1956) describe how to define a system as open or closed according to how much of the universe is included in the system and how much in the environment. Scott (1992) argues that the main approaches of organization theories development from classical to behavioural to systems can be categorized by closed system models (e.g. Taylor's (1911) scientific management model; Weber's (1968) bureaucratic theory) and open system models

(such as March and Simon's (1958) bounded rationality model; Williamson's (1975) Transaction Cost).

Input- Transformation-Output-Feedback cycle

The open system approach begins by identifying and mapping the repeated cycles of input, transformation, output, and feedback (Thompson, 1967; Katz and Kahn, 1978; Mullins, 2005), which is illustrated in Figure 2-1. For an organization system, *input* is some form of energy imported from the external environment (e.g. raw material, capital, human energy, technology, ideas, information, etc.). *Transformation* is a process, in which an open system transforms the energy available to the system (i.e. a process of creating a new product, providing services, training people, or constructing a building). *Output* is some product exported into the environment by open systems (such as, a new product, completed projects, accepted design, satisfied and committed staff, reputation for excellence, or satisfying customers). The concept of *feedback* is fundamental to understand how a system is maintained and therefore how it continues to exist and accomplish its purpose (Walker, 2002). Feedback in the cycle is connected with energy input, and provides a chance to correct input or transformation process to survive in the environment.

Permeability of Boundary

The open system model indicates that all organizations are incomplete and depend on exchanges with other systems (Scott, 1992). However, organizations must maintain the boundaries to exist in their environment, which separate them from their environment. Merriam Webster's Collegiate Dictionary (1996) defines permeability as "the quality or state of being permeable (p.865)". A permeable boundary permits to import and export information, resources, and energy between a system and its environment (French and Bell, Jr., 1999).

Environment and Environmental Forces

The boundary delineates the system: the system is inside the boundary, and the environment is outside the boundary, which can affect the system's state (French and Bell, Jr., 1999, Walker, 2002). Environmental change may affect the system, and the behaviour change in the system may also affect its environment (Hall and Fagen, 1956). Environmental forces are important factors to understand an organization as an

open system. The Figure2-1 shows a system in interaction with its environment (French and Bell, Jr., 1999).

In order to maintain survive and growth, the organization must respond to the opportunities and challenges, and the risks and limitations, presented by the external environment (Porter, 1980). Walker (2002) classifies environmental forces into four groups: (1) political, legal, and institutional; (2) cultural and sociological; (3) technological; (4) economic and competitive. Furthermore, the interdependency of environmental forces can increase the complexity of environment and the difficulty of analysis. According to Mullins (2005) and Lynch (2003), one popular technique for analyzing the general environment is “PESTEL analysis” (i.e. political, economic, socio-cultural, technological, environmental and legal influences).

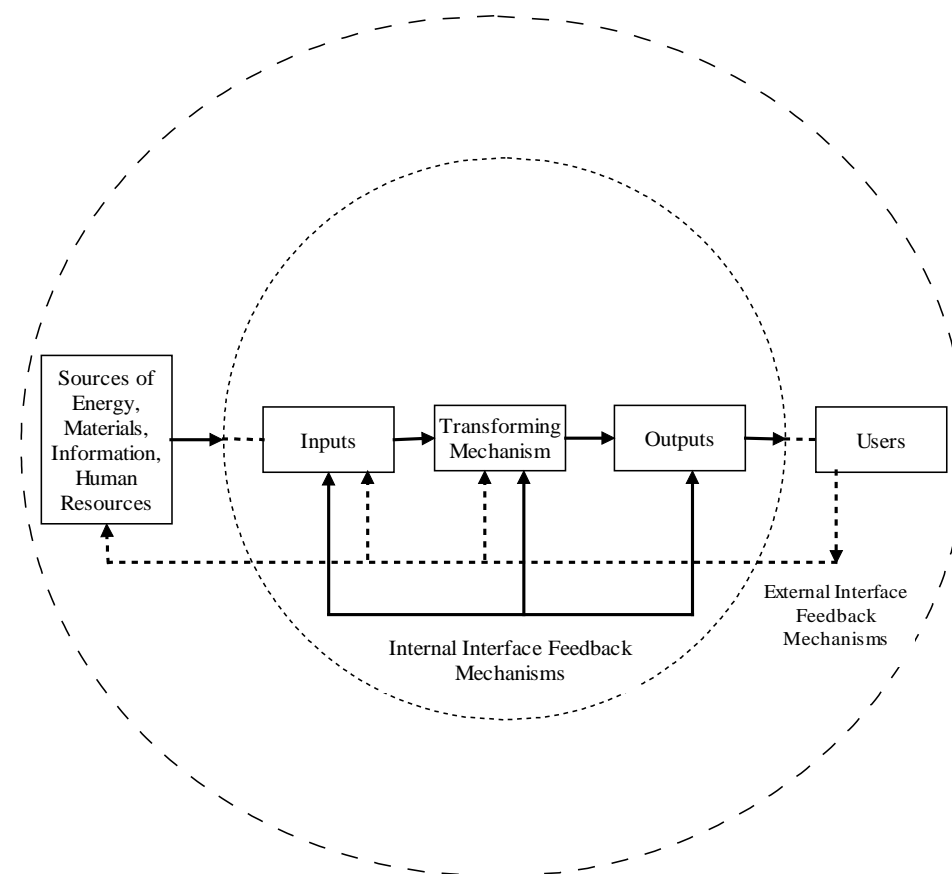


Figure 2- 1: A system in interaction with its environment
(Source: French and Bell, 1999, p.83)

Differentiation and Integration of Subsystems

Differentiation in organizations is defined as the differences in cognitive and emotional orientations among managers in different functional departments and the differences in formal structure among these departments (Dalton, et al., 1970). As differentiation proceeds, it is countered by processes that bring the system together for unified functioning (Katz and Kahn, 1978). Integration in organizations (Dalton, et al., 1970) is defined as the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the environment.

Interdependency

The definitions of a system explain the notion of interdependency, which is an entity consisting of interdependent parts (Walker, 2002). The interdependence between elements refers to the extent to which the elements are interrelated so that changes in the state of one element affect the state of the others. Thompson (1967) identifies three levels for assessing degree of interdependence, which are summarized by Scott (1992) as pooled interdependence, sequential interdependence, and reciprocal interdependence. And Scott (1992) indicates these three dimensions can be employed to predict the structural features of organizations.

Synergy

Synergy is the process by which the system generate the condition that the whole system is considered to be greater than the sum of its component parts (Mullins, 2005), which can be expressed simply in terms of the $2+2=5$ effect. Synergy is a ubiquity and unavoidable phenomenon (Corning, 1995) in nature (like individual organisms engaging in internal and external symbiosis) and social sciences (see market dynamics and technology innovation).

Entropy

The concept of entropy, which is energy that cannot be turned into work, is employed by systems theorists to elaborate the distinction between closed and open systems (Scott, 1992). The entropic process is applicable to all biological systems and closed physical systems. Katz and Kahn (1978) state the cycle of input, transformation, and output is a cycle of negative entropy (negentropy). So, an open system can store energy and acquire negentropy by importing more energy from its environment than it expends to achieve a steady state (Katz and Kahn, 1978; Walker 2002).

Equifinality

Equifinality in an open system means that a system can reach the same final state from differing initial conditions and by a variety of paths (Katz and Kahn, 1978). Similarly, Gresov and Dranzin (1997) argue the performance of an organisation can be achieved through different organisational structures when it faces the same environmental situation. According to Katz and Kahn (1978), the more control of their operations of open systems may reduce the amount of equifinality. So, in order to achieve high performance and formulate organisational strategy, equifinality explains the possibility and flexibility of alternative options and choices for decision makers.

Summary

Organizations, as a special class of open systems, share common concepts and properties with all open systems. The characteristics of input-transformation-output-feedback cycle and permeable boundary between system and environment present organizations' adaptation within their environments. 'Feedforward' is a complement alternative to 'feedback'. The law of negentropy states that the organizations cannot survive except they import from the environment more resources than they expend in the process of transformation and exportation. The characteristics of differentiation and integration, interdependency, and synergy, present the dynamics of subsystems and the relationships between them. Finally, the principle of equifinality asserts that systems can reach the same final state from different initial conditions and by different paths of development.

The application of general system theory to explain HR management research begins from Mowday (1983), who applies input-throughput-output model to manage and control behaviour to reduce turnover. Then, Wright and Snell (1991) adopt open system theory to generate HR management strategies, and they produce HR system including input (individual competencies, e.g. skills, knowledge and abilities), throughput (individual behaviours), and output (productivity, satisfaction, turnover). Wright and McMahan (1992) point out that HR managers need to monitor the outcomes of HR practices, adjust the practices when there is deviation between the outcome and the desire, adapt to the environmental change and response to the

feedback. So, this study adopts general system theory to explain an organisation (the construction enterprise) as a complex system of interdependent parts, including organizational strategy, structure, technology, HR management, and decision-making, within the environment of the Chinese construction industry.

During the transformation process from input to output, individual behaviours play an important role to implement organisational strategies (Schuler and Jackson, 1987), which is evidenced by the assumption in organisational role behaviour perspective that “employee role behaviour, in a generic sense, is the main mediator between strategy and the effective achievement of the strategy (Wright and McMahan, 1992, p.305)”.

2.2 Organisational role behaviour perspective

The organisation can exist when its employees perform their behaviours and attitudes, which reflect their beliefs, perceptions, habits and expectations, to satisfy the job requirements. Role in organisations is one of the most central constructs in organisational science because role connects the way we think about the job tasks and job behaviours.

Role theory is developed from theatre metaphors, and is a diverse theory to address the human interaction problems in sociology, psychology, and anthropology. As the actor performs his part on stage according to the scripts, which is predictable and differentiated, social actors are believed to perform their social parts in their social contexts. So, Biddle (1986) defines role theory as a triad of concepts: “patterned and characteristic social behaviours, parts or identities that are assumed by social participants, and scripts or expectations for behaviour that are understood by all and adhered to by performers (p.68)”. According to this definition, the basic concepts of role theory include characteristic behaviours (role), parts to be played (social position), and scripts for behaviour (role expectation). Role theory is presumed from “a thoughtful, socially aware human actor” perspective (Biddle, 1986), which means that role expectations are the major generators of role behaviours, and expectation are learned through experience and people are aware of the expectations they hold.

There are disagreements, however, regarding the modality of role expectations by role theorists. For example, role expectations are assumed as norms (i.e. prescriptive in nature, Bates and Harvey, 1975), beliefs (i.e. subjective probability, Kelly, 1955), or preferences (i.e. attitudes, Ilgen and Hollenbeck, 1991). Then, Biddle (1986) argues role expectations may appear simultaneously in norms, beliefs and preferences, which are learned through experiences.

Organisational role behaviour perspective focuses on social systems which are assumed to be pre-planned, task-oriented, and hierarchical. Roles in such organisations are assumed “to be associated with identified social positions and to be generated by normative expectations, but norms may vary among individuals and may reflect both the official demands of the organisations and the pressures of informal groups (p.73, Biddle, 1986)”. Organisational role behaviour perspective begins from the works of Gross, et al. (1958) and Kahn, et al. (1964). Katz and Kahn (1978) explain roles in this perspective theory as the linking point between the individual and the organizational levels of research. For example, each individual in the organisation, as a focal person, is connected with some sets of colleagues by virtue of functional requirements, which are implemented through these colleagues’ role expectations; and the organisation consists of a number of such sets. Organisations are also viewed as a system of roles based on two facts: the contrived nature and unique properties of a structure consisting of acts (Katz and Kahn, 1978). So, organisational role perspective can explain that role behaviours are developed from task requirements in a given functional relationship (Graen and Scandura, 1987; Uhl-Bien, Graen and Scandura, 2000).

There are four other approaches in sociology and social psychology during the development of role theory, because of the different concept of role adopted (assumed as norms, beliefs, or behaviours) for various purposes. *Functional approach* (Bates and Harvey, 1975) conceive roles as shared, normative expectations to describe the parts of stable social systems and to explain the differentiated behaviours, and this approach applies to analyse the individual satisfaction and social change in complex organisations. Role in *Symbolic interactionists* (Heiss, 1981; Zurcher, 1983) focuses on individual actual behaviour which reflects norms, attitudes and contextual

demands, and this approach is mostly applied to analyse informal interaction among individuals. *Structural role theory*'s (Nadel, 1957; Mandel, 1983) main interest is social structure rather than individuals, and assumes social structure stably consists of sets of social positions in which individuals share the pattern behaviours and can be expressed in mathematical symbols. Lastly, *Cognitive role theory* (Kelly, 1955) focuses on the relationships between role expectations (e.g. personal norms and beliefs) and role behaviours, and has been applied to understand family interaction (Carver and Scheier, 1981). Because this research aims to investigate the effects of HR practices on individual behaviour in the context of Chinese construction SOEs, *organisational role behaviour perspective* can be clearer to explain the relationships among HR practices (e.g. training, rewards, job design), tasks and job requirements, and individual actual in-role and extra-role behaviours, and has been applied in recent researches to explain individual behaviours in organisational context (such as, Wright and McMahan, 1992; Welbourne, et al., 1998; Van Dyne and LePine, 1998; Evans and Davis, 2005). So, this perspective is adopted in the following study.

According to organisational role behaviour perspective, roles are important for employees to delineate expected behaviours and to form the foundation of job descriptions. In this approach, Katz and Kahn (1978) describe content of *role expectation* mainly consists of preferences with respect to specific acts, personnel beliefs (such as, characteristics or style), and are not restricted to the job description. Regarding the definition of *role*, Ilgen and Hollenbeck (1991) give definition as “a pattern of behaviours perceived by an employee as behaviours that are expected”. Role is also defined by Katz and Kahn (1978) as “specific forms of behaviour associated with given *positions*” which are developed originally from task requirements and are played by individuals in a given functional relationship. And the closeness of functional relationships among individuals is determined by the work-flow structure, technology, and authority of organization. Then, the actual individual behaviour is interrelated with other individuals' to yield a predictable outcome.

Roles define the individuals' responsibilities, but in dynamic organisations (e.g. construction project organisation), individuals experience continuous role episodes, including role taking (as subordinate receiving his/her roles), and role making (between supervisor and subordinate) (Katz and Kahn, 1978; Graen and Scandura,

1987). *Role taking* (also called role-receiving) refers that the subordinate takes the roles of the others without negotiation (e.g. the engineer received the request from the manager to complete one part of building design.), and successful role taking may facilitate personnel development and social integration (Biddle, 1986; Uhl-Bien, et al., 2000). *Role making* (also called role-sending) is the process by which the focal person actively negotiates and communicates his/her definitions (e.g. discussion in the project meeting) from role expectations with a set of role senders (Graen and Scandura, 1987). When the subordinate make an offer to go beyond the defined roles (see extra-role description) and the offer is accepted by the manager, such role making may success (Uhl-Bien, et al., 2000). Role making process include a series of testing (to determine the capabilities, motivation and obligations), developing, and then maintaining the relationship within formal roles or going beyond job obligations (see extra-role behaviour) with increasing trust, respect and mutual obligation (Uhl-Bien, et al., 2000). So, the focal people responses to the role taking and complex information, influences the process of role making, and then performs the role behaviour, which require role skills including conceptual, behavioural and technical skills (Dev, 1989).

In empirical studies, the practices questions and concepts (regarding roles and role expectations) also draw the researchers' attention, such as: in-role and extra-role behaviour (Williams and Anderson, 1991; Morrison, 1994; Motowidlo, et al., 1997), role ambiguity and role conflict (Jackson and Schuler, 1985; Tubre and Collins, 2000), consensus (Rossi and Berk, 1985), stress (Rizzo, et al., 1970), job satisfaction (Abramis, 1994), and job performance (Abramis, 1994; Sonnentag and Frese, 2001). According to Uhl-Bien, et al. (2000), role making and role taking develop differentiated relationships (i.e. functional and dysfunctional), which may affect the individual outcomes (see employee performance and job satisfaction, Mayfield and Mayfield, 1998) and organisational outcomes (e.g. greater organisational flexibility, Murphy and Jackson, 1999), and have implications for HR management. For example, the reward practice can promote employee's role making and role taking; participant can provide opportunities for employees to interact for relationship building.

HR management is the organization's primary means for sending role information through the organization (i.e. role making process), supporting desired behaviours, and evaluating role performances (Solomon, et al., 1985; Evans and Davis, 2005). For example, empowering employees (like participant in decision making) can motivate their active role behaviours. Wright and McMahan (1992) adopt role behaviour perspective in the context of strategic HR management (depicted in Figure 2-2), and they propose that different business characteristics (including strategy) require different individual skills, knowledge, abilities and attitudes (i.e. needed role behaviour), which then require different HR practices (e.g. training and appraisal) to elicit and reinforce employee's behaviour (i.e. actual role behaviours) to achieve organisational strategies.

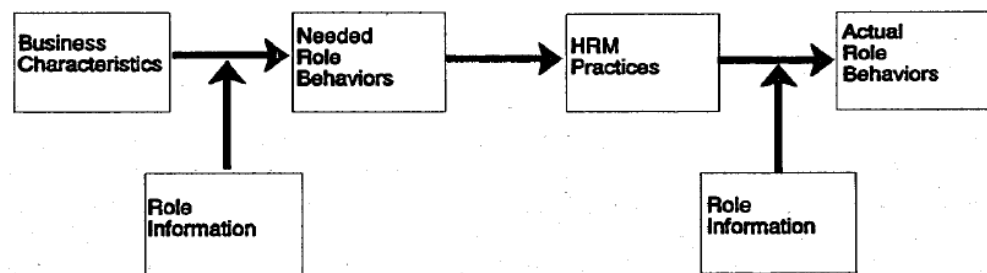


Figure 2- 2: Role behaviour perspective for understanding HR practices
(Source: Wright and McMahan, 1992, p. 304)

Similarly, Schuler and Jackson (1987) propose a rationale, needed role behaviours (as role expectations), to link between strategy and HR practices. The needed role behaviours not only concern about the specific task required skills, knowledge and ability (in-role behaviour), but also employee relationship between each other (role conflict and ambiguity) in the social environment (i.e. extra-role behaviour). According to Schuler and Jackson (1987), innovation strategy requires such individual behaviours as high degree of creative, longer-term focus, high level of cooperative and interdependent, moderate concern about quantity and quality, greater degree of risk taking, and high tolerance of ambiguity and unpredictability; on the contrary, cost reduction strategy needs behaviours as predictable, short-term focus, autonomous activity, high concern for quantity, low risk-taking, and high degree of comfort with stability.

Welbourne, Johnson and Erez (1998), however, argue that organisational role theory only conceptualizes and identifies multiple job-related behaviours, but does not clarify which dimensions of roles be included or excluded in the performance measurement. Then, they apply identity theory (Thoits, 1991) and identify five roles in terms of job, organisation, career, team and innovator.

From organisational role behaviour perspective, scholars have argued that HR practices can contribute to elicit and reinforce employees' in-role behaviours and motivate extra-role behaviours to provide psychological social environment, improve organisational performance and develop sustained competitive advantage. However, role behaviour perspective cannot tell the whole story about the creation of sustained competitive advantage. Individual behaviours are also determined by environmental stimuli, human volition and internal cognitive processes, and characteristics of observable and transferrable may make individual behaviours easily duplicated (Lado and Wilson, 1994). So, it is necessary to adopt resource-based view to recognise organisational internal resources to create sustained competitive advantage. As Wernerfelt (1984) argues that conceptually resources are important antecedents to products and then to organisational performance.

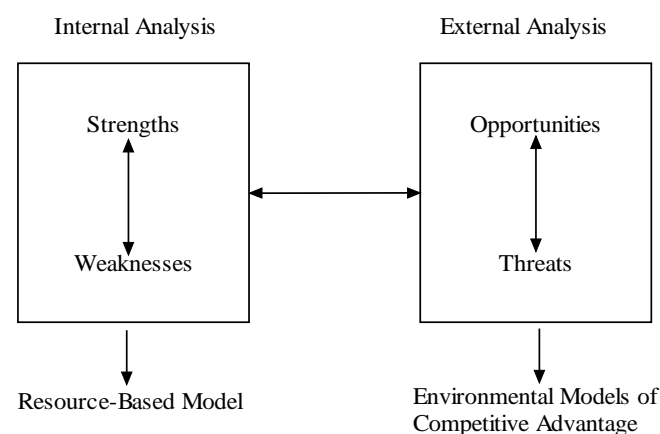
2.3 Resource-based view

Originated from Ricardo's (1817) farmland example to demonstrate that scarce resource can generate more profits, resource-based view is developed based on this logic and the assumptions that proper resources distribution (valuable, rare, inimitable and non-substitutable resources) can provide competitive advantage for organisation prosperity (Wernerfelt, 1984 and 1995; Barney, 1991). Barney (1991) states the two assumptions of resource-based view to be: (1) resources are distributed heterogeneously across firms, and (2) these productive resources cannot be transferred between firms without cost.

The application of resource-based view contributes to strategic management development. For example, Priem and Butler (2001) summarize its application on the breadth of diffusion in strategy research topics, including strategic concepts (e.g.

alternative frameworks, innovations, and organisational learning), strategic management processes, board of directors, general management roles in strategy management, strategy formulation, environmental analysis, strategy implementation and evaluation, strategy content (e.g. human resource management as a resource), formal planning systems, strategic control, entrepreneurship and new ventures, and multi-business multi-cultural firms. At the same time, Barney, et al. (2001) analyze the impact of resource-based view on five specific areas, including HR management (Wright, et al. 2001), economics (Combs and Ketchen, 1999), entrepreneurship (Alvarez and Busenitz, 2001), marketing (Srivastava, et al. 2001), and international business (Peng, 2001).

In the strategic management field, resource-based theory focuses on the link between organizational strategy and the internal environment, which is adopted to analyze the organizational strategy formulation concerning the organization's internal resources (Grant, 1991; Barney, 1991). For example, Barney (2001) defines resources are “the tangible and intangible assets a firm uses to choose and implement its strategies (p.54)”. Porter's (1980) ‘five forces model’ focuses on the link between strategy and external environment (industry structure and competitive positioning). Then, Barney (1991) summaries the relationship between traditional ‘strengths – weaknesses – opportunities – threats’ (SWOT) analysis, the resource-based model, and models of industry attractiveness, which is illustrated in Figure 2-3.



*Figure 2- 3: The relationship between traditional SWOT analysis, the Resource-based model, and models of industry attractiveness
(Source: Barney, 1991, p.100)*

Another fundamental assumption of resource-based view is that organizations can be successful if they gain and maintain their competitive advantages (Wright, et al.,

1994; Das and Teng, 2000). Competitive advantage is defined as either engaging activities to increase firm effectiveness in ways that competitors are not; or returning expectations of the firm's stakeholders, which is also called an economic rent (Barney, 2001, p.48). Wernerfelt (1995) argues that organisation impossibly succeed if its strategies are not resource-based. Scholars classify the organizational resources into three categories: physical capital resources (Williamson, 1975), human capital resources (Becker, 1964), and organizational capital resources (Tomer, 1987). Physical capital resources refer to the organisation's physical technology, plant, equipment, geographic location, and access to raw materials; human capital resources emphasize the individual skill, knowledge and capability, and the relationships between staffs and between staff and managers; organisational capital resources refer to organisational level resources, e.g. the formal and informal structure, decision making system, and the relationship between the organisation and its operation environment (Barney, 1991). Organisational resources are also categorized as tangible (e.g. plants and financial resources) and intangible resources (like human capital).

Barney (1991) summarizes that these three categories of resources have characteristics of value, rarity, imperfect imitability and non-substitutability, and he believes that the potential for sustained competitive advantage requires the resources to have these four characteristics. *Value* refers to the capability to make a difference for the organisation and contribute to future organisational prosperity; compared with the availability in market, resource *rarity* means some specific resources are short of or insufficient to the extent; *imperfect imitability* focuses on the resources are difficult (or impossible) to imitate (or copy), e.g. the core technology in the organisation, high performance HR management system; then, *non-substitutability* emphasizes the resource cannot be replaced by other equally or more effective resources.

It is the combination of these four sets of characteristics of resources that provides an organization with the opportunity to gain sustained competitive advantage (Powell, 1992; Combs and Ketchen, 1999). However, even though one organisation owns the resources which are valuable, rare, inimitable and lack substitutes, it does not guarantee the value creation in a dynamic operation environment (Priem and Butler, 2001). Lippman and Rumelt (2003) argue that resources can only create values when they are evaluated and appropriately deployed in the organisation environment.

Furthermore, Sirmon, Hitt and Ireland (2007) argue that resource-based view entails the oversight of the change of environment in resources management, so they adopt environment orientation to structure the resource portfolio to build capabilities, and then to provide value to customers and create wealth for shareholders. Hence, the organisation should view itself as an organism system during resource management process within its environmental context to develop the competitive advantage (Hart, 1995). For example, after analysing the environment forces in 12 large Chinese construction firms, Cheah, et al. (2007) find three significant resources and competencies (namely financial capabilities, technological and innovative capability, and guanxi resources (relationship, such as with financial institutes and clients)) Chinese contractors need strength to develop the competitive advantage. To compete in international market, Zhao and Shen (2008) argue that the weaknesses of the Chinese contractors include lack of well-trained human resources, absence of design capability, weak financial capability, and language disadvantage; and the strengths include low labour cost and high degree of adaptability to work in different environments, lower price of construction components (such as China-made mechanical and electric components), advancement in certain technologies (e.g. highway and railroad bridges, retaining structure for deep foundation pits, pre-stressed concrete, and etc.), advantageous geographical location (such as Asia and developing countries, e.g. Pakistan, Bangladesh, Thailand) compared with Western competitors, and Good relationship with developing countries, particularly in Africa and the Middle east.

Barney (2001) derives several hypotheses through parameterizing some aspects of resource-based view (i.e. value, rarity and imitability) to argue Priem and Butler (2001)'s tautology critique regarding the theory. Barney (2001) argues for the critiques of equifinality (e.g. difficulty to define appropriate boundaries of a specific industry, inappropriate assumption about the technological and competitive stability), product market (i.e. factor market /product market model), and the inapplicability (see managerial manipulation of resources, context nonspecification, all-inclusive definition of resources, and static resource-based logic); and then he suggests the adoption of resource-based view to answer the questions of strategic alternatives, rent appropriation, and strategy implementation. Furthermore, basing on previous papers regarding resource-based view, Barney, Wright and Ketchen (2001) identify seven

further research areas from the incorporation of resource-based view, which include dynamic capabilities and knowledge, corporate governance, management buy-outs and venture capital financing, institutional environment, entrepreneurship, organisational behaviour (ethics and corporate social responsibility, and management information systems), and methodological issues.

Empirically, resource-based view has been tested by several research studies in the last two decades. Henderson and Cockburn (1994) measure the value, rarity and imitability of competence, which impact on the research productivity in pharmaceutical firms. Hitt, et al. (2001) find the direct and moderating effects (curvilinear relationship) of human capital with strategies (i.e. service diversification and geographic diversification) on organisational performance in professional service firms. In the context of Spanish manufacturing firms (over 10 employees), Esteve-Perez and Manez-Castillejo (2008) confirm that the firm's strategy which develops specific assets (e.g. advertising, and making research and development policy) may enhance its ability to adapt to the environment, and improves its survival prospects. Ray, et al. (2004) propose the effectiveness of business processes (e.g. acquiring suppliers, producing services, or delivering products) as the dependent variable in empirical tests of the resource-based view rather than overall firm performance, and the results are consistent with the expectations of resource-based view (e.g. intangible and socially complex capability contribute to customer service performance). However, Newbert (2007) assesses the empirical support on the resource-based view collecting 55 articles and 549 individual tests, and finds 47 percent of the tests fail to support the hypothesized effects of resources. More importantly, Newbert (2007) finds that the specific capability and core competence contribute to competitive advantage and firm performance (with 71% and 67% supporting tests respectively), but the static resources do not determine the firms' competitive position (with 37% supporting tests). Interestingly, Newbert (2007) finds that the most popular resource studied in the sample is human capital.

Limitations of resource-based view and development of dynamic capabilities

Conceptually, the resource-based view has been called vague and tautological, because it does not explain the mechanisms by which how resources contribute to

competitive advantage (Priem and Butler, 2000). The resource-based view has also been criticized as a static theory, especially when a firm operates in a dynamic environment (Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000). Thus, researchers have extended and enhanced the resource-based view into dynamic markets by addressing the evolutionary nature of firms' resources (Wang and Ahmed, 2007) and so, the concept of "dynamic capabilities" emerges. Furthermore, Helfat and Peteraf (2003) introduce the concept of capability lifecycle to underpin the dynamic resource-based theory. Wang and Ahmed (2007) propose market dynamism as the antecedent of dynamic capabilities with capability development and firm performance as consequences of dynamic capabilities.

Teece, et al. (1997: 516) define dynamic capabilities as: "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments". From the process perspective, Eisenhardt and Martin (2000: 1107) define dynamic capabilities as: "The firm's processes that use resources – specially the processes to integrate, reconfigure, gain and release resource – to match and even create market change. Dynamic capabilities thus are the organisational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die". Cepeda and Vera (2007) explain the dynamic capabilities from the 'input (initial) – transformation – output (new)' process of the configuration of resources and operational routines' changes. Wang and Ahmed (2007: 35) argue that dynamic capabilities are not only processes, but embedded in processes, which are "developed over time through complex interact between the firm's resources". The difference between operational capabilities (zero-order) and dynamic capabilities (first-order) has been identified by Zollo and Winter (2002): operational capabilities refer to the operational functioning of the firm; dynamic capabilities are dedicated to the modification of operating routines and lead to the changes of routines, services or products over time. From the behaviour perspective, Zollo and Winter (2002: 340) propose the definition that: "a dynamic capability is a learned and stable pattern of collective activity through which the organisation systematically generates and modifies its operating routines in pursuit of improved effectiveness".

In sum, as an extension of the resource-based view, dynamic capabilities address the question of how valuable resources can be created and refreshed in a changing

environment. Ambrosini and Bowman (2009) summarise the enabling and inhibiting variables within and outside the firm which shape dynamic capabilities: external factors include levels of dynamism in the external environment (e.g. uncertainty, complexity and munificence), and firms' 'history matters'; internal factors include managerial behaviour (e.g. managers' perceptions of the environment, proactivity, leadership), learning, the existing set of resources, and social capital. By integrating the dynamic capability view, Bowman and Ambrosini (2003: 289) extend the resource-based view to inform the understanding of corporate-level strategy; they conclude that: "corporate centres may possess resources but must display dynamic capabilities otherwise they will destroy shareholder value". Regarding HR management, Wright, et al. (2001: 716) imply the HR issues to the understanding and development of dynamic capabilities, e.g. "it is facilitated by people management systems that promote the change of both the stock and flow of knowledge within the firm that enable a firm to constantly renew its core competencies".

The application of resource-based view in HR management

Scholars have adopted resource-based view and considered HR management as a resource (e.g. one of strategy content) to achieve organizational continuous improvement (Wright and McMahan, 1992; Lado and Wilson, 1994; Jackson and Schuler, 1995). Based on Barney's (1991) theoretical model, Wright and McMahan (1992) present resource-based view as a rationale to explain human resource (i.e. a pool of skills) as a competitive advantage, because human resources can provide value to the firm (assuming the heterogeneous demand for labour and heterogeneous supply or labour); employees' superior ability is rare (e.g. attracting candidates with high ability level in selection, and retaining them by reward system); human resource can be inimitable because of unique historical conditions, causal ambiguity and social complexity (e.g. unique social relationship between employees and organisations); and human resource cannot be substituted compared with technology (even the technology is imitated). Then, Wright, McMahan, and McWilliams (1994) discuss the difference between human resources (refer to the skills pool, and potentially a source of competitive advantage) and HR practices (as tools to manage and facilitate to increase human capital pool, and individual HR practices may be imitable). However, Lado and Wilson (1994) argue that HR practice systems (as opposed to individual

ones) contribute to firm competencies and are not easily imitable (e.g. unique and causally ambiguous). Furthermore, Boxall (1996) emphasizes the importance of human capital advantage and learning capability, and describes human process advantage as “a function of causally ambiguous, socially complex, historically evolved processes such as learning, cooperation, and innovation (p.67)”. Wright, Dunford and Snell (2001) develop a dynamic model to show that HR practices system (e.g. staffing, training, rewards, participation, etc.) influences the human capital pool (i.e. individuals’ knowledge, skills and abilities) and elicits employee relationships and behaviours (e.g. in-role behaviour, OCB, or psychological contracts), and propose that the combination of these three components may provide sustained competitive advantage. There are several empirical applications of the resource-based view in HR management, including those of Huselid (1995), Koch and McGrath (1996), Huselid, Jackson and Schuler (1997), Boxall and Steeneveld (1999), Youndt and Snell (2004), etc..

One of the limitations of the resource-based view in empirical HR research is that most of the empirical studies only investigate a small number, usually two, of the variables as HR practices and firm performance. Hence, researchers need a deeper understanding of the resource-based view to recognize the process developed when adopting HR practices (Wright, et al., 2001), dynamic capability (i.e. gain, integrate, and release resources to fit with market change), knowledge management (i.e. knowledge creation, transfer and integration), and intellectual capital (e.g. human, social and organisational capital). The intersection of strategy and HR issues under resource-based view brings out knowledge (Grant, 1996) and organisational learning (Smith, et al., 1996) as the major resources for competitive advantage. For example, Hatch and Dyer (2004) find that the development of human capital (which is intangible, firm-specific and socially complex nature) through HR practices (e.g. selection, training), has impact on learning and, then, on performance.

Knowledge-based view

Within the dynamic and uncertain environment, organisations need to capture knowledge-based resources to adapt to the changes. According to Zahra and George (2002) and Simon, Hitt and Ireland (2007), organisational learning is important to

provide a potential capability for strategic flexibility and adapting to environmental changes. Miller (1996) describes organisational learning as “the acquisition of new knowledge by actors who are able and willing to apply that knowledge in making decisions or influencing others in the organisation (p.486)”. So, knowledge-based view is an outgrowth of resource-based theory, which regards knowledge as the most strategically important resource and conceptualize firms as heterogeneous knowledge-bearing entities (Grant, 1996; Nonaka, 1994; Zander and Kogut, 1995; Hoskisson, et al., 1999). Knowledge is categorized as explicit and tacit knowledge (Spender, 1996). Zander and Kogut (1995) describe knowledge from five dimensions of codifiability, teachability, complexity, system dependence, and product observability.

Nonaka (1994) argues for the knowledge-based view as a basic theory for building a truly “humanistic” knowledge society. In order to utilize knowledge to create value for firms, it is necessary to identify the characteristics of knowledge in knowledge-based view (Grant, 1996), which are transferability (i.e. ease of communication), capability for aggregation (see transfer and absorptive capacity), appropriability (refer to the clear property rights for the knowledge owners). Then, consistent with Simon’s (1991) arguments, Grant (1996) proposes two assumptions for knowledge integration within firms: “(1) knowledge creation is an individual activity; (2) the primary role of firms is in the application of existing knowledge to the production of goods and services (p.112)”. Organisational process is also important for a firm to access, accumulate and utilize knowledge owned by its employees. For example, March (1991) emphasizes that organisational knowledge exists in its procedures, norms, rules and forms; during knowledge transfer among employees, common knowledge may enhance the efficiency of knowledge integration. Grant (1996) identifies five types of common knowledge in terms of language (e.g. common language in group problem solving), other forms of symbolic communication (e.g. familiarity with the specific software during work), commonality of specialized knowledge, shared meaning, and recognition of individual knowledge domains (e.g. in a debating team, each member need aware of other’s knowledge repertoire). The integration of employees’ specialized knowledge results in organisational capability (Spender, 1996). For example, Lei, Hitt, and Bettis (1996) argue that the organization can maintain value and continuous development through meta-learning.

The development from resource-based to knowledge-based view has changed the design and behaviour at organisational level to respond to the environmental change, because employees (as knowledge creating entities) undertake their tasks and learned experiences during the jobs' process, and then organisations ally their employees with other tangible and intangible resources to provide products or services (Spender, 1996). Based on the knowledge-based view, Spender (1996) views the organisation as a knowledge-based activity system, which is "a synthesis of socio-technical systems theory and self-regulating biological systems (p.59)".

To summarise, *General system theory* (Bertalanffy 1969; Cleland and King 1983; Walker 2002) is applied in this chapter to explain an organisation (the construction enterprise) as a complex system of interdependent parts, including organizational strategy, structure, technology, HR management, decision-making, within the environment of the Chinese construction industry. *Organisational role behaviour perspective* provides the linking pin between the individual and the organizational levels of research where role behaviours are developed from task requirements in a given functional relationship (Katz and Kahn, 1978). *Resource-based view*, which focuses on the link between organizational strategy and the internal environment, is adopted to analyze the strategy formulation concerning the organization's resources (Wernerfelt 1995), for example, human resources, organisational knowledge and organisational learning. Developed from the resource-based view, *knowledge-based view* proposes that the organisation is an activity system that involves employees (as knowledge creating entities) in the organisational development to create competitive advantage (Nonaka, 1994; Spender, 1996). The theories guide the researcher to connect main variables and to develop the research framework in Chapter 3.

Chapter 3 Literature Review and Research Framework

Based on the theories (general system theory, organisational role behaviour perspective theory and resource-based view theory) described in chapter 2, the main constructs of HR management, organisational learning, organisational performance and individual behaviour are further reviewed in this chapter, followed by the research framework which depicts the theoretical connection among main constructs during organisation operation process.

3.1 Human Resource Management

According to the resource-based theory, human resource with other resources give the organisation unique character and lead to differences in its performance. Becker and Huselid (1998) state that “An internally consistent and coherent HR management system that is focused on solving operational problems and implementing the firm’s competitive strategies is the basis for the acquisition, motivation, and developing of the underlying intellectual assets that can be a source of sustained competitive advantage. (p.55)” In this section, the definitions of HR management are introduced, followed by the explanation of HR practices. Then, the specifications and characteristics of HR management in construction industry are reviewed and discussed.

3.1.1 Definitions and dimensions of HR management

Despite considerable research articles have provided evidences of the possible effects of HR management on organisational performance (Arthur, 1994; Huselid, 1995; Youndt and Snell, 2004; Collins and Smith, 2006; Takeuchi, et al., 2007), a precise meaning and consistent definition on HR management construct remain elusive and need to be clarified (Arthur and Boyles, 2007). From traditional personnel management perspective, Boxall and Purcell (2003, p.1) define it as “all those activities associated with the management of employment relationships in the firm”.

From a strategic nature, which is called a ‘best fit or hard HR management’, Buchanan and Huczynshi (2004, p.679) define HR management as “a managerial perspective which argues the need to establish an integrated series of personnel policies to support organizational strategy”. Another theme focuses on practices (called ‘best practice or soft HR Management’) to aim at increasing employee commitment and capability to enhance business performance, which assume employees as valued assets and a resource of competitive advantage through their skills and abilities. For example, Storey (1995, p.5) defines HR management as “a distinctive approach to employment management which seeks to achieve competitive advantage through the strategic deployment of a highly committed and capable workforce, using an array of cultural, structural and personnel techniques”. However, no matter HR management is “hard” or “soft”, it should be ethical to treat individuals with respect and accept the freedom of an individual (Greenwood, 2002).

Based on previous studies, HR management is a multi-level construct (including micro, strategic and international), and clear definitions of HR system help to understand HR management. In order to address definitional, analyses level and measurement issues of the HR system, Arthur and Boyles (2007) identify five components of HR system structure: HR principles, policies, programs, practices and climate, which are listed in Table 3-1.

Table3- 1: Examples of some conceptual and empirical studies of HR system construct components

(Source: Arthur and Boyles, 2007)

HR system component	Representative Studies
HR principles: stated values, beliefs and norms regarding what drives employee performance and how organizational resources and rewards should be allocated	Dennison (1990) McGregor (1960) Miles (1975) O'Reilly and Pfeffer (2000)
HR policies: organizational goals or objectives for managing human resources	Lepak and snell (1999) Osterman (1988) Ouchi (1980) Walton (1985) Arthur (1994)
HR programs: the set of formal HR activities used in the organization.	Delery and Doty (1996) Gurhrie (2001) Huselid (1995)

HR practices: the implementation and experience of an organization's HR programs by lower-level managers and employees	Marsden, Kalleberg, and Cook (1996) Wright, Dunford et al. (2001)
HR climate: shared employee perceptions and interpretations of the meaning of HR principles, policies and programs in their organization	Bowen and Ostroff (2004) Collins and Smith (2006) Gelade and Ivery (2003) Riordan, Vandenberg, and Richardson (2005)

HR principles, defined as values, beliefs and norms, is the most abstract component, and O'Reilly and Pfeffer (2000) discuss the management philosophies or principles which can shape organisational culture and guide decision making. Similarly, Becker and Gerhart's (1996) 'HR system architecture' is defined as guiding principles, underlying implementation of HR policies and practices. According to the value and uniqueness of human capital, Lepak and Snell (1999) develop an HR architecture that aligns four different HR configurations (commitment, market based, compliance and collaborative), employment modes (internal development, acquisition, contracting and alliance) and employment relationships (organisation focused, symbiotic, transactional and partnership).

HR policies (or intended HR strategies) refer to organisational goals or strategies for managing human assets, and incorporate the choice of HR program in terms of recruitment, training, appraisal, job design and participation (Wright and Boswell, 2002). For example, the organisation that follows a quality strategy may train, develop, and invite employees to participate in decisions, in order to stimulate cooperation and obtain the continuous improvement that quality implies (Katou and Budhwar, 2008). The organisations with an innovation strategy emphasizes longer-term and group-based achievement performance appraisal, develops skills with flexible job design, and fosters employees exchange ideas and risk taking. However, organizations with a cost reduction strategy put less emphasis on employee training and development, but keep monitoring market pay levels and have short-term, result-oriented performance appraisals. The aim in implementing HR policies is to gain competitive advantage (Schuler and Jackson, 1987). There are other typologies regarding HR policies. Lepak and Snell (1999) summarize four 'employment modes' (internal development, acquisition, contracting and alliance) which focus on two

dimensions on attracting and buying human resources externally, or retaining and developing human capital assets internally. Ouchi (1980) identifies three mechanisms as markets, bureaucracies and clans to improve cooperation between employees, according to the costs of mediating exchanges between individuals (goal incongruence and performance ambiguity). In sum, HR policies, representing the strategies for managing human resource assets and shaping individual behaviour at work, guide the implementation of HR programs.

Arthur and Boyles (2007) define HR program as the set of formal HR activities used in the organisation, which should be aligned with HR policies. Previous empirical strategic HR management studies have focused on HR program by identifying bundles of internally consistent HR practices and investigating the relationship between these sets of practices and organisational performance. For example, Arthur (1992, 1994), after cluster analysis, identifies two categories of HR practices that he labels 'control (cost reducers)' and 'commitment' from thirty American steel minimills. Huselid (1995) identifies a set of HR practices and labels 'high performance work systems' from 968 U.S. firms representing all major industries. Interviewing organisational representatives (by questionnaire) from 661 companies in the United States ranged from 5 to 6000 employees and including every industry category, Toh, Morgeson and Campion (2008) measure broad HR practices (i.e. recruitment and selection, training and development, compensation and benefits, performance appraisal, and participation), and find five distinctive HR bundles based on cluster analysis: cost minimizers (control), contingent motivators (contingent pay practices based on knowledge, term performance, and customer satisfaction), competitive motivators (market competitive pay and benefits), resource makers (skill enhancement), and commitment maximizers (full range of high performance work systems). One set of HR program comprises HR practices to fulfil the goals of employee commitment, skill enhancement, motivation, and cost minimization.

HR practices refer to the implementation and experience of an organisational HR program by employees (Arthur and Boyles, 2007). The distinction of HR program and practices is that practices capture the potential variation in employees' perception and experience of an HR program adopted by the company. For example, at the HR program level a manager may report the company provide the majority of employees

with outside training opportunities every two years. But because few employees are aware that the program exists, or the manager discourages them to participate, it is seldom used. In this case, the individual perception of this program would be very different from the program designed by the top management. Hence, the HR practices in this study can be seen as “a function of both the existence of a specific HR program as well as the quality of the HR program’s implementation (Arthur and Boyles, 2007, p.80)”.

HR climate, consistent with the general definition of organisational climate, is defined as the shared employee perceptions and interpretations of the meaning of the HR principles, policies, programs, and practices in their firm (Arthur and Boyles, 2007). Similarly, Bowen and Ostroff (2004) introduce ‘strength of HR system’ in which employees share a common interpretation of what is important and what behaviours are expected and rewarded, which might lead to firm performance.

The above review clarifies five components of HR system based on Arthur and Boyles (2007)’s framework. This study aims to investigate the relationship between implementation of HR practices and performance in Chinese construction SOEs, so it is necessary to clearly define and explain each HR practice.

3.1.2 HR practices

As we discussed above, different HR practices are employed according to the organisation’s specific HR policies. In strategic HR management field, researchers either adopt resource-based or control-based approach to measure HR practices (Bamberger and Meshoulam, 2000). Resource-based approach emphasizes practices of internal employees’ development, such as training and job design (Delery and Doty, 1996). Control-based approach, on the contrary, describes the extent to which HR practices relate to monitoring market pay levels and result-oriented performance appraisals (Snell, 1992). Because neither approach can adequately capture the domain of HR practices, Bamberger and Meshoulam (2000) suggest to combine them as orthogonal dimensions of a measure of high-performance HR practices, which include three HR subsystems: (1) people flow (i.e. staffing, training, mobility, and job

security), (2) appraisal and rewards, (3) employment relation (i.e. job design, and participation), as shown in table 3-2. Sun, Aryee and Law (2007) adapt this bundle of HR practices in the context of China's hotel industry.

Table3- 2: Configuration of high-performance HR practices
(Source: Bamberger and Meshoulam, 2000; adapted by Sun, Aryee and Law, 2007, p.560)

HR Sub-system	Dimension	
	Resource and Control-Based HR Practices	Sample HR Practices
People flow	Staffing Training Mobility Job security	Selective staffing More extensive, general skills training Broad career paths, promotion from within Guarantee of job security
Appraisal and rewards	Appraisal Rewards	Long-term, results-oriented appraisal Extensive, open-ended rewards
Employment relation	Job design Participation	Broad job descriptions, flexible job assignments Encouragement of participation

Organisations have recognised the contribution of employee knowledge, skills and abilities to their goals achievement and performance improvement. *Staffing and recruitment* is an important practice for organisations to attract qualified applicants and ensure desired applicants accept job offers. Based on Barber (1998), Ma and Allen (2009) state recruitment activities as “a process aimed at attracting applicants with required qualifications and keeping them interested in the organisation so that they will accept a job offer when it is extended (p.336)”. Similarly, Rynes (1991) defines recruitment as “encompassing all organisational practices and decisions that affect either the number, or types, of individuals that are willing to apply for, or to accept, a given vacancy (p.429)”. Possible predictors of applicant attraction include job and organisational characteristics, recruiter characteristics, perceptions of the recruitment process, perceived fit, perceived alternatives, and hiring expectancies (Rynes, Bretz and Gerhart, 1991; Breaugh, 2008). Chapman, et al. (2005), based on previous research, identify the four recruiting outcome variables to be job pursuit intentions, job-organisation attraction, acceptance intentions, and job choice. When there is lack of specific staff with knowledge and skills, organisations may either ‘buy’ from labour market (recruitment), or ‘make’ their own staff to acquire the knowledge (training).

Within the complex operational environment, organisations need to train their employees to acquire new technology and knowledge for long-term investments. Goldstein (1980) defines *training* as “the acquisition of skills, concepts, or attitudes that results in improved performance in an on-the-job environment”. The first step to arrange training is needs assessment from the perspectives of organisation, task, person and demographic (Latham, 1988; Tannenbaum and Yukl, 1992). One additional reason to arrange training activities is for multitasking and role transitions within organisation. From the outcome perspective, Goldstein and Ford (2002) describe “training” as a systematic approach to learning and development to improve individual, team and organizational effectiveness. However, training program cannot be effective until trainees apply the knowledge, skills and attitudes gained in the training to the job implementation. Baldwin and Ford (1988) review the transfer of training research literature reported over the last decade from training inputs, including trainee characteristics (ability, personality and motivation), training design (principles of learning, sequencing and training content) and work environment (support and opportunity to use), to training outputs (learning and retention). Training outcome is also called evaluation by previous researchers (Goldstein, 1980; Tannenbaum and Yukl, 1992). Kraiger, Ford and Salas (1993) apply cognitive, skill-based and affective theories to evaluate learning outcomes. Furthermore, Chen and Klimoski (2007), after reviewing the progress and development of training literature, argue that learning process takes place between training antecedents and training evaluation. Training for employees is not only on improving their skills to perform current jobs, but also on preparing for future responsibilities.

Mobility is also an important perspective of people flow in organisations, because succession planning is high priority for an organisation to prepare human resource plan (Tsui and Wu, 2005). Mobility is described by Delery and Doty (1996) as ‘internal career opportunities’, ‘the extent to which an organisation has an internal career ladder or internal career opportunities (p.815)’. Organisations which have clear path plan may motivate employees to achieve their personal goals through working. Clear career opportunities can also help employees plan their future within the organisation and choose the learning direction. An effective manager would train his/her replacement, and prepare that person in place ready to go. On the other hand,

promotion depends on whether the potential replacement has been trained ready to take over that position.

Job security is conceptualized by Delery and Doty (1996) as “the degree to which an employee could expect to stay in his/her job over an extended period of time (p.815)”. Usually job security arises from the terms of the employment contract, or labour legislation that prevents arbitrary termination and layoffs. Job security can be enhanced by well-devised human resource planning and flexible organisational structure (Marchington and Wilkinson, 2008).

As the organisation wants to develop in the long term, it would implement proper *reward and appraisal practice* (also called ‘compensation’) to the achievement of its business goals and satisfy the needs of its stakeholders (Becker and Huselid, 1998). If the organisation pays more than rivals, it can attract more individuals who possess superior abilities to apply for the jobs, and then increase the quality of their applicant pool; and it can also motivate their employees to apply their skills and knowledge in their work-related activities (Way, 2002). The reward practices are underpinned by organisational philosophy based upon which employees are valued and rewarded (Armstrong, 2006). Similarly, Allen and Kilmann (2001) describe that “the reward system should be aligned to motivate employee performance that is consistent with the firm’s strategy, attract and retain people with the knowledge, skills and abilities required to realize the firm’s strategic goals, and create a supportive culture and structure”(p.114). Based on factor analysis of a wide variety of reward practices, Allen and Kilmann (2001) conclude two factors of intrinsic and extrinsic reward practices, which is consistent with Porter and Lawler’s (1968) conceptual analysis. The determinants of rewards not only include task performance, but also include extra role performance which beyond his/her job duty (Van Scotter, et al. 2000). Rewards and appraisal are not focused merely on the amount of pay, but on communicating preferred behaviours and accentuating long-term investment in employees (Tsui and Wu, 2005). Furthermore, group-based performance payment continues to receive attention within reward literature (Huselid, 1995). For example, Way (2002) states that employee appraisal which emphasizes group-based achievement can enhance employees’ retention and their motivation to apply their skills and behaviour script in group work.

Within the changing working environment, because of multitasking, role transitions and involvement of job nature, employees need to solve conflict, communicate and participate with their colleagues. *Employee relations practices* concern about the stable and cooperative relationships, commitment achievement, and mutuality development (Armstrong, 2006). Organisations need to think about what need to be done or changed to manage its relationship with their employees. IRS (1993) identifies four approaches to employee relations as adversarial, traditional, partnership and power sharing. Usually, employee relations practices include job description, flexible job design and encouragement of participation. According to Delery and Doty (1996), job description refers to the extent to which jobs are clearly and precisely defined; employee participation (voice) is “the degree to which employees are allowed to have input into their work and the degree to which the organisation values their input (p.815)”. Flexible job assignments (e.g. job rotation, ability to perform +1 job, and job enrichment) can broaden employee knowledge, skills, abilities and behaviour scripts, and then produces superior employees output (Way, 2002; Evans and Davis, 2005).

Employees is one source of organisational competitive advantage and sustainable development, and the strategic role of HR management has been acknowledged by scholars and practitioner communities. The literature review above explained individual HR practice separately, the internal fit among each other is more important and discussed by Becker and Huselid (1998), Delery and Shaw (2001), and Evans and Davis (2005). In this study, HR practices are referred from an integrated system perspective, which are both internally (consistent and coherent among each practice) and externally consistent (alignment with organisational strategy and structure) discussed in conceptual framework section. The construction industry is project-based. Construction enterprises need to deploy qualified staff (project manager, various engineers, financial employees, foreman, etc.) in different departments during project realisation; HR management is vital for project success and organizational performance (Druker, White, Hegewisch and Mayne, 1996; Loosemore, Dainty and Lingard 2003; Raiden, Dainty and Neale, 2006).

3.1.3 HR management in construction organisation

HR management is an important component for construction organisations, which are within the dynamic and fast changing environment in terms of operational, technical and financial perspectives. In a project based industry, success of one project depends on skilled labour and professional staffs from different functional departments coordinate and apply their skills and behaviour script during project realisation under the project organisation structure, because of the fragmentation and dynamism of project procurement process. Loosemore, et al. (2003) outline five challenges of managing people in construction from the nature of construction's products and services: the unique, one-off nature of projects; projects' tendency to be awarded at short notice; projects' reliance on a transient workforce; increasingly demanding clients; and a male-dominated culture. To overcome these challenges, construction organisations need to establish HR policies and practices to recruit qualified staff, provide extensive training opportunities, satisfy employees' expectations, secure employee involvement identified, collect suggestions, increase commitment and reduce conflict, to balance requirements of project stakeholders (Maloney, 1997; Raiden, Dainty and Neale, 2006). However, Dainty, Grugulis and Langford (2007) review the current context of construction employment in special issue of 'personnel review', and reveal the skills shortages, informal employment practices, lack of employee involvement (such as task participation and team working) which impede productivity improvement because of interplay of structural and cultural factors, in spite of repeated calls for construction industry to improve its HR practices.

Lockyer and Scholarios (2007) identify selection in construction project as *ad hoc* (for example, searching for workers to match immediate employment needs), and evaluate current recruitment and selection practice amongst Scottish construction firms, which is informal (such as personal contacts and recommendations). Then, they propose a model of the selection decision process and emphasize the importance of site managers in making decisions and the presence of local industry networks. Similarly, Raiden, Dainty and Neale (2008) allege the reactive and *ad hoc* approach of employee resourcing in construction organisation investigated from HR planning, project deployment, performance/career management, recruitment, employee involvement, and training and development.

According to Boxall and Purcell's (2003) 'people and performance' model, Raiden, Dainty and Neale (2006) abstract employees' "Ability, Motivation and Opportunity" as the basis of high performance organisation. They emphasize the internal fit and match among HR practices may likely affect performance, and find the missing link at project level in delivering the strategic intentions from organisational level to individual level. And then, they develop a framework to integrate all HR practices to satisfy employee needs, project operational requirements and organisational strategic priorities.

Generally, HR practices can facilitate the development of competency, generate tacit organizational knowledge, and may contribute to the capacity of the organization to learn (Soliman and Spooner 2000). For example, from one case study of a large UK construction contractor, Raiden and Dainty (2006) propose that the organisational project-based structure and informal culture combine to form a "Chaordic learning organisation" which operates in a non-linear dynamic environment.

3.2 Organisational learning

Organisations, especially construction firms, currently operate in a more turbulent and fast changing market environment than before. As an open system, an organisation interacts with and adapts to its environment, and needs to acquire knowledge within and outside of the organisation to survive and succeed (Cyert and March, 1963).

Training and developing activities in one organisation may lead to improved employees' skills, knowledge and ability to motivate individual learning, which has a significant impact but does not necessarily lead to organisational learning (Argyris and Schon, 1978; Field, 1997). According to Argyris (1977), organisational learning is "the process of detecting and correcting error. Error is for our purposes any feature of knowledge or knowing that inhibits learning (p.116)". Individual is the key to organisational learning, because it is individual thinking and acting that produces learning (Argyris, 1995). So the organisation needs to establish causal interdependency between individuals and the organisation to enable learning.

3.2.1 Definitions and development of organisational learning

There are various dimensions to define organisational learning. For example, Nevis et al. (1995) define organizational learning as the capacity or process within an organization to maintain or improve performance based on its experience. Klimecki and Lassleben (1998) describe organizational learning as the changes in organizational knowledge that are induced by information processing and that enable an organization to find new ways of surviving and succeeding in new situations. Lopez, et al. (2006, p.217) define organizational learning as “a dynamic process of creation, acquisition and integration of knowledge aimed at developing the resources and capabilities that allow the organization to achieve a better performance”. Critically, Wang and Ahmed (2003) identify five foci of organizational learning to create proliferation of definitions as individual learning, process or system, culture or metaphor, knowledge management, and continuous improvement. They summarise the organisational learning concepts practices from the five foci in Table 3-3.

There are two types of organization learning (Argyris 1977), single-loop (corrective) and double-loop learning (generative). Single-loop learning enables organisations carry on present practices. The metaphor of single-loop learning is that of thermostat, which correct room temperature according the requirement. Double-loop learning is more comprehensive to detect and correct error by questioning underlying programs and strategies. Wang and Ahmed (2003) further explain organisations’ triple-loop learning as making future plan to ensure the continuous improvement in their performance.

Huber (1991, p.90) articulates four constructs related to organizational learning as: knowledge acquisition, information distribution, information interpretation, and organizational memory. He elaborates that “Knowledge acquisition is the process by which knowledge is obtained. Information distribution is the process by which information from different sources is shared and thereby leads to new information or understanding. Information interpretation is the process by which distributed information is given one or more commonly understood interpretations. Organizational memory is the means by which knowledge is stored for future use”. According to Huber (1991, p.88), ‘knowledge acquisition’ can be portrayed as

consisting of five subconstructs or subprocesses: “(1) drawing on knowledge available at the organization’s birth, (2) learning from experience, (3) learning by observing other organizations, (4) grafting on to itself components that possess knowledge needed but not possessed by the organization, and (5) noticing or searching for information about the organization’s environment and performance”. A number of researchers use these four sub-constructs of organizational learning (Lopez, et al., 2006; Tippins and Sohi, 2003; Slater and Narver, 1995).

*Table3- 3: A summary of the organisational learning concept and practices
(Source: Wang and Ahmed, 2003, p.10)*

Focus	The concept of organisational learning	Practices
Individual learning	“Organisational learning occurs when individuals within an organisation experience a problematic situation and inquire into it on the organisational behalf” (Argyris and Schon, 1996, p. 16)	Staff training and development
Process or system	Organisational learning is the process whereby organisations understand and manage their experiences (Glynn et al., 1992)	Enhancement of information processing and problem solving capability
Culture or metaphor	“A learning organisation should be viewed as a metaphor rather than a distinct type of structure, whose employees learn conscious communal processes for continually generating, retaining and leveraging individual and collective learning to improve performance of the organisational system in ways important to all stakeholders and by monitoring and improving performance” (Drew and Smith, 1995)	Creation and maintenance of learning culture: collaborative team working, employee empowerment and involvement, etc.
Knowledge management	Organisational learning is the changes in the state of knowledge (Lyles, 1992, 1998). It involves knowledge acquisition, dissemination, refinement, creation and implementation: the ability to acquire diverse information and to share common understanding so that this knowledge can be exploited (Fiol, 1994) and the ability to develop insights, knowledge, and to associate among past and future activities (Fiol and Lyles, 1985)	Facilitation of interaction and strengthening of knowledge base
Continuous improvement	“A learning organisation should consciously and intentionally devote to the facilitation of individual learning in order to continuously transform the entire organisation and its context” (Pedler et al., 1991)	The adoption of TQM practices

Nevis, Dibella and Gould (1995) describe organisations as learning systems from two-part model in terms of learning orientations and facilitating factors. Learning orientations are the values and practices which reflect the place and nature of what is

learned. The seven learning orientations include knowledge source (internal-external), product-process focus (what?-how?), documentation mode (personal-public), dissemination mode (formal-informal), learning focus (incremental-transformative), value-chain focus (design-deliver) and skill development focus (individual-group). Facilitating factors are the organisational structures and processes that affect the easy extent and amount for learning to occur, including scanning imperative, performance gap, concern for measurement, experimental mind-set, climate of openness, continuous education, operational variety, multiple advocates, involved leadership and systems perspective.

Crossan, et al. (1999) allege organisational learning is linked by four categories of social and psychological processes: intuiting, interpreting, integrating, and institutionalizing (4Is) showed in Table3-4. “Intuiting is the preconscious recognition of the pattern and/or possibilities inherent in a personal stream of experience. (Crossan, et al., 1999, p.525)” The intuiting process can affect the intuitive individual’s behaviour and others when interact with other individuals. Interpreting is the process of explaining an insight or idea through words (conversation/dialogue) and/or actions, and it results in language and cognitive map. Integrating is developing shared understandings among individuals and mutual adjustment, which is *ad hoc* and informal. Institutionalizing is the process of ensuring that routinized actions occur, and developing routines, rules and procedures.

*Table3- 4: Learning/Renewal in organisations: four processes through three levels
(Source: Crossan, et al., 1999, p.525)*

Level	Process	Inputs/Outcomes
Individual	Intuiting	Experiences Images Metaphors
	Interpreting	Language Cognitive map Conversation/dialogue
Group	Integrating	Shared understandings Mutual adjustment Interactive systems
Organization	Institutionalizing	Routines Diagnostic systems Rules and procedures

After analysing the four processes of intuiting, interpreting, integrating and institutionalizing, Crossan, et al. (1999) develop a discontinuous and dynamic organisational learning process over individual, group and organisational level, which is depicted in Figure 3-1. They state that there is a tension between assimilating new learning (feed forward) and using the knowledge learned (feedback). Bontis, et al. (2002) adopt Crossan, et al.'s model, and find that the stocks and flows of learning are positively associated with business performance at three levels, and the misalignment of stocks and flows is negatively associated with business performance.

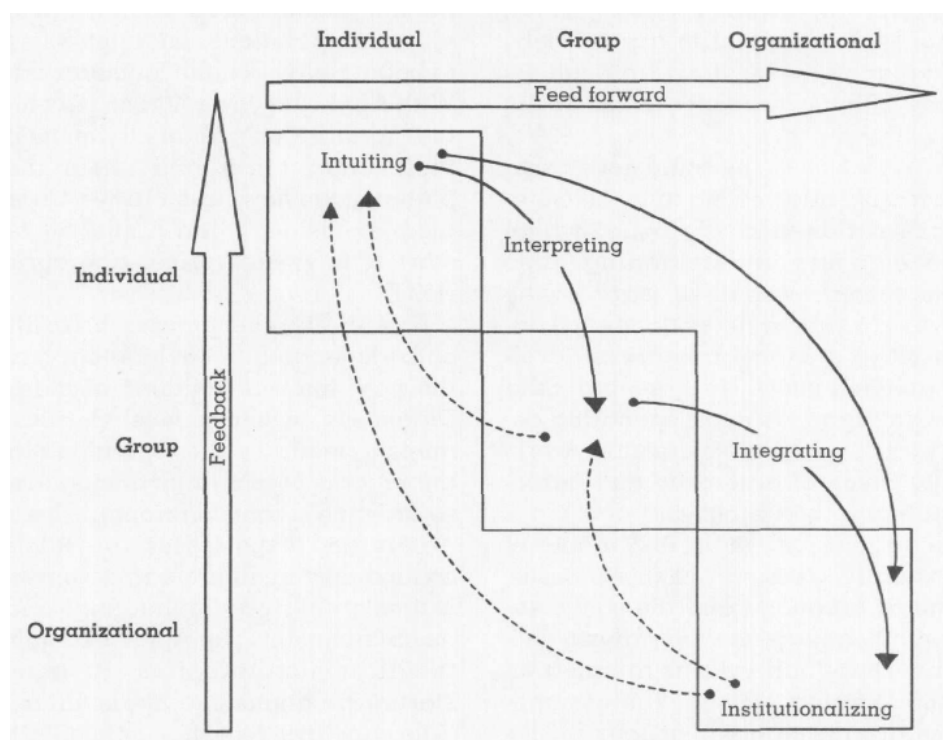


Figure 3- 1: Organisational learning as a dynamic process
(Source: Crossan, et al., 1999, p.532)

The terms 'knowledge' and 'learning' are often used interchangeably, which may lead to conceptual confusion (Bontis, et al. 2002; Spender 2008). Ackoff (1989) develops four typologies as a hierarchical model including data, information, knowledge and wisdom. Knowledge is the appropriate collection of information. There are two types of knowledge, 'tacit' and 'explicit', of which tacit knowledge is the basis of individual and organisational competence (Starbuck, 1992; Nonaka, 1994).

Knowledge management is mainly used in the field of strategic management whereas organizational learning is investigated within the area of human resources (Chiva and

Alegre, 2005). Generally, knowledge management identifies the organisation's knowledge assets, collects, stores and optimizes them, and then delivers the optimized knowledge to expected location and turns it into value (Spender, 2008).

Organizational knowledge can be considered as the key component of organizational learning, which is a process associated with the growth of and changes in knowledge (Chiva and Alegre 2005). Organisational learning is to create organisational knowledge, whereas knowledge management is to optimize knowledge and deliver its economic value. From time perspective, organisational learning is generally adopted as behaviour change and perceived as more effective behaviour at time t_2 compared with previous behaviour (Spender, 2008). On the contrary, knowledge management concerns less with change over time.

The concept of 'Learning organisation' emerges when an organisation has ability to learn like a biological organism to adapt to environmental change (Pedler, et al., 1989). A learning organisation tries to achieve breakthroughs and obtain competitive advantage in the market. Senge (1990) applies systems thinking to develop a learning organisation from five "component technologies" including personal mastery, mental models, building shared vision, team learning and systems thinking.

However, "unlearning" has been accepted as the new focus in organisational learning (Wang and Ahmed, 2003). People will not abandon current beliefs and policies until incontrovertible failure evidence to convince them to make a new plan. So, organisations have to accept some degree of unlearning, which emphasize change mind set rather than try to prolong the life cycle of an existing product or policy.

In construction, multi-stakeholders involve and cooperate in one single project through project life cycle (from planning, design, construction to using stage). So, various experts take part in one construction project at different times. Then, organisational learning in construction projects and firms is important because the demands of communication and learning-by-doing experience differ among participants (Styhre, et al., 2004; Chan, et al., 2005).

3.2.2 Organisational learning in construction

Organisational learning draws the attention of construction researchers. For example, Kululanga, Price and McCaffer (2002) investigate the UK contractors' organizational learning from the dimensions and factors that support learning, and find that the majority of contractors focus their learning on individual employees' continuous learning. Styhre, et al. (2004) examine six Swedish construction projects and find that learning capabilities in construction projects rely on informal and personal contacts rather than technical and formal system.

Project-based and fragmentation characteristics increase the difficulty for learning in construction firms. Prencipe and Tell (2001) investigate the processes and outcomes of project-to-project learning, and identify three learning landscape as explorer, navigator and exploiter, which are based on different learning processes as experience accumulation, knowledge articulation and knowledge codification respectively. Barlow and Jashapara (1998) discuss how partnering helps organisational learning during construction project realisation, because partnering can provide a more controlled and lower risk environment for partners to develop new skills and methods. At the same time, they also identify four factors affecting mature organisational learning: inherent tensions and conflicts between clients and suppliers; transferability of knowledge between organisations (including the ability to codify knowledge, and the partnering relationship term); the ability to recognise value of knowledge, retain and distribute it; organisational internal political and cultural environments that aid or hinder communication structures. Chan, et al. (2005) recommend that the research challenges in construction project level lie in the leadership dynamics of inter-organisational learning (because each project is a temporary multi-organisation); and they urge to view projects as learning networks. Love, et al. (2000) combine concepts of total quality management and organisational learning to propose a learning organisation in construction which can learn from its previous mistakes to improve its performance.

From the dimension of knowledge management, Tan, et al. (2006) investigate the requirements for the live capture and reuse of project knowledge in construction to achieve continuous improvement in 6 UK construction companies, and suggest

combination of knowledge management technology(e.g. groupware, expert directory, project extranet) and techniques(e.g. communities of practice, training, forum, post-project reviews). Robinson, et al. (2004) develop a framework to formulate knowledge management strategy to address business problems. Chinowsky and Carrillo (2007) bridge the link between knowledge management and learning organization based on the knowledge management steps and learning organization maturity models.

The aim of organization learning is to improve performance through the development of organisational knowledge and capability. For example, Wong and Cheung (2008) examine the contingency between intra- and inter- organizational learning to improve the performance in the context of construction industry in Hong Kong.

3.3 Organisational Performance

Imagine the following three construction organisations' performance:

- a. The financial returns on investment have increased for the last five years, but the relationship between employees and the firm is tension. The turnover is high, because the firm controls investment in human resource development.
- b. The company is named as 'best employer' but the financial performance is tenuous. The organisation pays more on the benefits of employees and social responsibilities.
- c. The company is recognised as 'green' by public because they invest more on environment protection during construction process, like construction waste management. But it increases cost and reduces efficiency.

Is it difficult to rank the performance of three construction organisations? The following section examines: how to define and measure organisational performance in the context of construction organisation.

3.3.1 Definitions and development of organisational performance

Organizational performance is a complex and multi-faceted concept in terms of its economic, social and environmental change. Performance is defined by Mitchell

(1983) as an aggregate of behaviour over time, tasks or people. Chien (2004) states the different meanings of performance: “from a process view, performance means the transformation of inputs into outputs for achieving certain outcomes; with regard to its content, performance informs about the relation between minimal and effective cost (economy), between effective cost and realized output (efficiency) and between output and achieved outcome (effectiveness)”. Performance is generally represented by the following relationship (Naoum, 2001): Performance = effectiveness, efficiency and participant satisfaction. Following Neely, et al. (1995) and Naoum (2001), organisational performance is defined as: the extent to which its stakeholders’ requirements are met, and how economically the firm’s resources are utilized when providing a given level of customers’ satisfaction.

‘Performance’ and ‘effectiveness’ are used interchangeably and perceived as similar concepts by researchers for decades (Henri, 2004; Neely, et al., 1995). Henri (2004) states that “organisation effectiveness represents the outcome of organisational activities while performance measurement consists of an assessment tool to measure effectiveness”. According to Henri (2004), organizational effectiveness reflects “a construct perspective in which the focus is on the definition of the concept in terms of assessment and conceptualization”. For example, Chakravarthy (1986) identifies effectiveness assessment from profitability, financial-market, multi-stakeholder satisfaction, and quality of firm’s transformations. Based on the studies by Goodman et al. (1977) and Cameron (1984), Henri (2004) summarizes five models which capture the richness of the organisational effectiveness in Table 3-5. (1) Goal model (Etzioni, 1960) measures effectiveness from the achievement of goals and objectives. (2) System model (Yuchtman and Seashore, 1967) emphasizes organisation system measurement from inputs, transformation process to outputs. (3) Strategic-constituencies model (Connolly, et al., 1980) considers external and internal stakeholders’ satisfaction to ensure the effectiveness. (4) Competing-values model extends the previous models and views organisation as a set of competing values, and there are four models of effectiveness as rational goals, internal process, open system and human relations (Quinn and Rohrbaugh, 1983). (5) Ineffectiveness model (Cameron, 1984) assumes it is more reliable to identify problems and faults in organisations, so effectiveness is to reduce factors which inhibit organisational performance.

According to Becker and Huselid (1998), seven programs can improve a firm's performance: employability, selective recruitment, teamwork and decentralization, high remuneration, intensive training, eliminating inequalities and boosting team spirit, and extensive information sharing. Similarly, Boselie, et al. (2001) and Paauwe and Boselie (2005) argue that the performance outcomes of HR management include: financial outcomes (profits, sales, market share); organizational outcomes (outputs measures, such as productivity, quality, efficiencies); and HR-related outcomes (attitudinal and behavioural impacts among employees, such as satisfaction, commitment and intention to quit).

*Table3- 5: Models of organisational effectiveness
(Source: Henri, 2004, p.99)*

Model	Conceptualization of the organization	Focus	Advocates
1 - Goal model	Organization as a rational set of arrangements oriented toward achieving goals.	Accomplishment of outcomes (ends)	Etzioni 1960
2 - System model	Organization as an open system (input, transformation, output).	Inputs, acquisition of resources and internal processes (means)	Yuchtman and Seashore 1967
3 - Strategic-constituencies model	Organization as internal and external constituencies that negotiate a complex set of constraints, goals and referents.	Response to the expectations of powerful interest groups that gravitate around the organization	Connolly et al. 1980
4 - Competing-values model	Organization as a set of competing values which create multiple conflicting goals.	Three dimensions of competing values: * Internal vs external focus * Control vs flexibility concern * Ends vs means concern	Quinn and Rohrbaugh 1983
5 - Ineffectiveness model	Organization as a set of problems and faults.	Factors that inhibit successful organizational performance	Cameron 1984
Source: Goodman et al. (1977), Cameron (1984)			

The organisation operates under its strategy. In order to evaluate the merit of a particular strategy, we need to measure its performance (Kaplan and Norton, 1996). The adoption of HR practices and organizational learning is to improve its performance, so performance measurement can be a tool to assess the effectiveness of the practices and policies, and then make adjustments in adapting to environmental change.

3.3.2 Organisational performance's measurement

There is little agreement on how organizational performance should be measured (Neely, et al. 1995; Gomes, et al. 2004; Henri 2004; Hubbard, 2009). Performance measurement is defined by Neely, et al. (1995) as “the internal process of quantifying the efficiency and effectiveness of action with a set of metrics”.

The perception of organisational performance measurement has been shifted dramatically from shareholder (see Porter, 1980) to stakeholder approach (Freeman, 1984; Kaplan and Norton, 1992) in last two decades. Stakeholder is defined as a person, group, or organisation that has direct or indirect stake in an organisation because it can affect or be affected by the organisation's actions, objectives, and policies (Freeman, 1984). Stakeholders in an organisation include shareholders, employees, customers, suppliers, government, local communities, and so forth. Berman, et al. (1999) investigate stakeholder orientation with strategy (cost efficiency, asset parsimony and marketing differentiation) to influence organisational performance, and find that employees and product safety/quality can help improve organisational financial performance.

From the stakeholder approach, organisational performance is measured against the expectations of various stakeholders. Following Ghalayini and Noble (1996), Gomes, et al. (2004) review 338 articles from 1988 to the end of 2000 related to performance measurement, and summarise its 5-stage development depicted in Figure 3-2, relating performance measurement system to operational process. When the organisation runs as a close system, it adopts cost accounting orientation and financial measures (e.g. return on investment, earnings per share) starting from 1880 to evaluate the operating cost to aid managers to make decisions. On the other hand, with the dynamic operation as an open system in mind, the organisation prefers to integrate financial and non-financial indicators to measure multifaceted performance (McNair and Mosconi, 1987; Santori and Anderson, 1987).

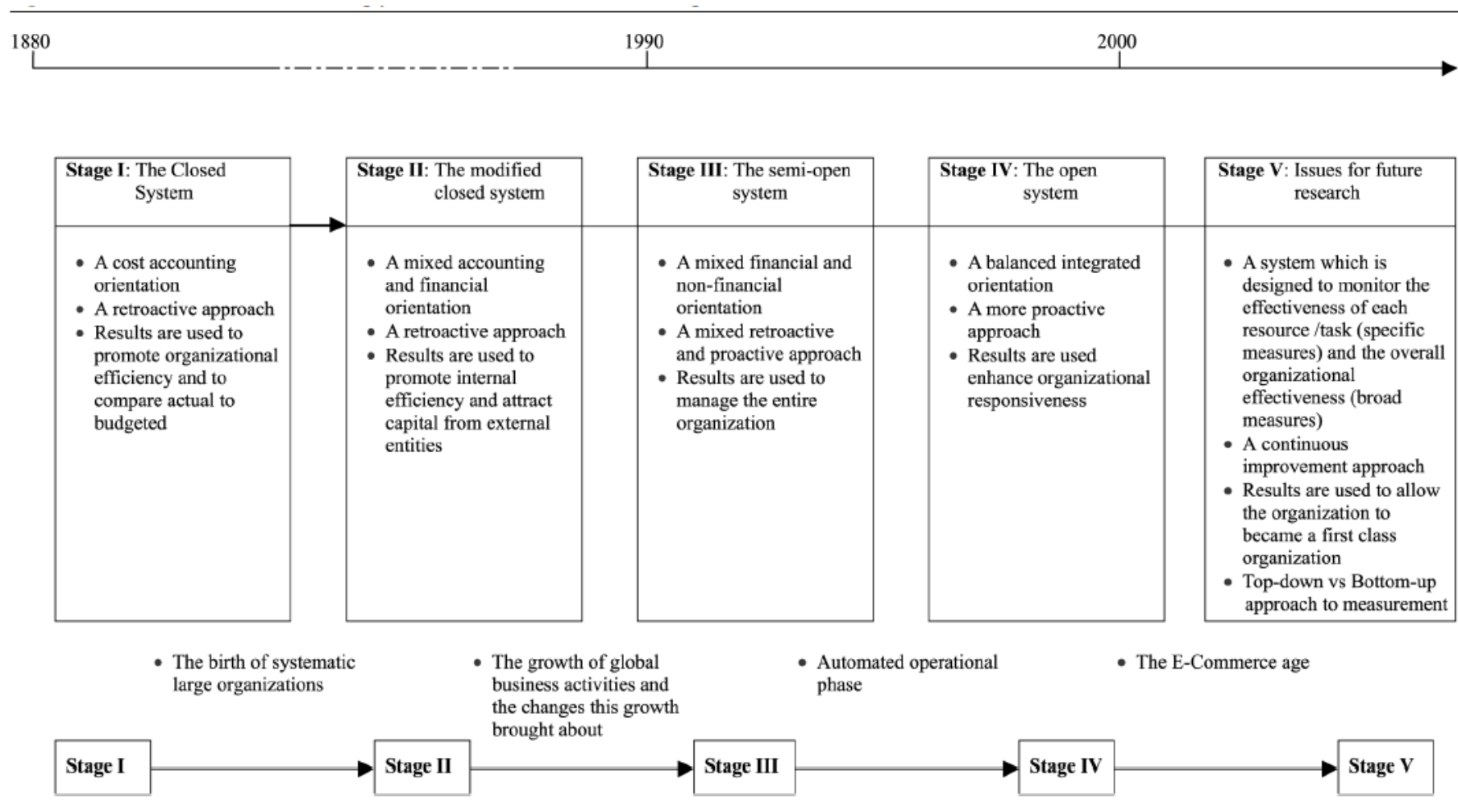


Figure 3- 2: The evolution of performance measurement in an organisational context
(Source: Gomes, et al. 2004, p.523)

Similarly, Henri (2004) argues that performance measurement develops from cybernetic view to holistic view in terms of roles, design and organisational impacts. From Cybernetic view (Hofstede, 1978; Merchant and Simons, 1986), performance measurement is an element within the planning and control cycle to monitor strategy implementation and detect and correct variances when comparing the actual results with planned objectives. Performance measurement focuses on financial measures and links to diagnostic control system to monitor performance and provide feedback (Simons, 1990). Cybernetic view performance measurement (like returns on investment) discourage managers from innovating and encourage conservatism (Dent, 1990). On the contrary, performance measurement in holistic view contributes to strategy formulation and implementation (Kaplan and Norton, 1992, 1996) and extends single-loop learning to double-loop learning (Argyris and Schon, 1978). Organisation performance integrates financial and non-financial measures with short and long-term view. Holistic view performance measurement encourages risk taking and promotes experimentation and curiosity (Dent, 1990; Nanni, et al., 1992).

Currently, scholars use 'integrated', 'balanced' or 'multidimensional' to describe organisational performance measurement to achieve 'overall organisational effectiveness', 'continuous improvement' or 'a first class organisation'. Gomes, et al. (2004) summarize the characteristics of modern performance measurement systems, including:

- “ must reflect relevant non-financial information based on key success factors of each business;
- should be implemented as a means of articulating strategy and monitoring business results;
- should be based on organizational objectives, critical success factors, and customer needs and should monitor both financial and non-financial aspects;
- must accordingly change dynamically with the strategy;
- must meet the needs of specific situations in manufacturing operations and should be long-term oriented as well as simple to understand and implement;
- must make a link to reward systems; and
- financial and non-financial measures must be aligned and fit within a strategic framework.”

Furthermore, nowadays organisations pay more attention to the social responsibility and environmental issues to be sustainable development (i.e. environmental integrity, social equity and economic prosperity). Hubbard (2009) integrates sustainability concept in the measurement system and develops sustainable balanced scorecard including financial, internal process, customer/market, learning and development, environmental and social perspectives.

Concerning practical performance measurement systems, the widely recognized measurement metrics include: the Performance Measurement Matrix (Keegan, Eiler and Jones, 1989), which includes cost, non-cost, internal and external matrix indicators; the SMART (strategic measurement and reporting technique) Pyramid metric (Lynch and Cross, 1991), which includes internal and external measures in different levels from individual, team level to business process and unit level; the Results-Determinants framework (Fitzgerald, et al., 1991), which refers to results (competitiveness and financial performance) and the determinants of those results (quality, flexibility, resource utilisation and innovation); the Input-Process-Output-Outcome framework (Brown, 1996), which measures a linear set of relationships between inputs, processes, outputs, outcomes and goals; Balanced Scorecard (Kaplan and Norton 1996), which identifies and integrates four perspectives of financial, customer, internal business, and innovation and learning; Key Performance Indicators (KPIs), which measures critical success factors according to the organisational goals; the Excellence Model (EFQM, 1999), which is a broad management model that highlights the enablers (leadership, people, policy and strategy, partnerships and resources, and process) of performance improvement and indicates results(people, customer, society) areas. Because balanced scorecard, excellence model and key performance indicators metrics are increasingly used in construction organisations (Bassioni, et al, 2004), these three metrics are discussed in the following section.

Balanced Scorecard metric

As previous review, traditional financial performance measure is limited, short term view and lagging outcome indicator, which may give wrong signals for firm development, balanced scorecard metric (see Figure3-3) is devised by Kaplan and Norton (1992) to combine operational measures (i.e. customer, internal business, learning and innovation perspectives) with financial measures in the measurement

system, which can increase future financial performance. According to Kaplan and Norton (1992), customer perspective emphasizes customer oriented to deliver value to customers in terms of time, quality, performance and service, and cost; internal business perspective refers to process, decisions and actions throughout organisation operation to satisfy employees' needs; learning and innovation perspective keeps organisation's competitive position adapting to changing to make continual improvement; financial perspective indicates whether the implication of strategy contributes to bottom-line improvement, and the financial goals usually include profitability, growth and shareholder values. Non-financial measures (namely customer, internal business, learning and innovation) are leading indicators of change, and financial measures are lagging indicators (Schneiderman, 1999).

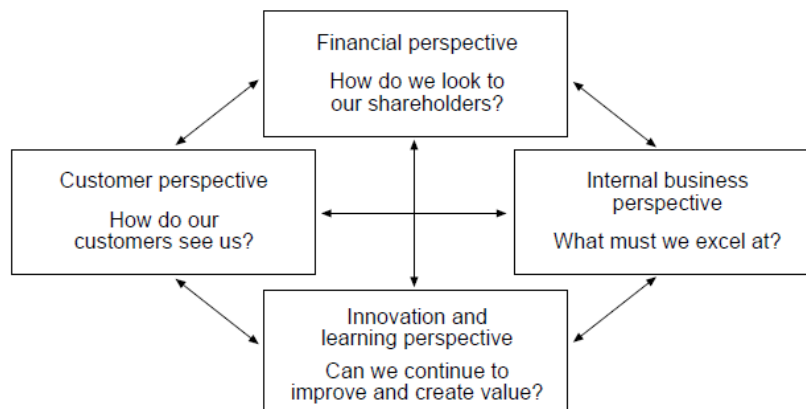


Figure 3- 3: The Balanced Scorecard
(Source: Kaplan and Norton, 1992, p.72)

Furthermore, Kaplan and Norton (1996) describe the processes (i.e. transforming the vision, communicating and linking, business planning, and feedback and learning) around the balance scorecard measurement in strategic management to link long-term strategies with short-term actions, to fill the gap between the mission statement and employees' perception of their contribution to realize the firm's vision. For example, Amaratunga, et al. (2001) implement balanced scorecard measurement as a process improvement technique, e.g. the learning process, from vision to action plan process. And, Kaplan and Norton (2001) integrate balanced scorecard metric and organisational strategy to formulate a framework called 'Strategy map' which identify the path intended to achieve the organization goals.

However, Neely and Bourne (2000) claim that 70 percent of balanced scorecard implementations fail because of poor design and difficulty of implementation. Schneiderman (1999) discusses the reasons why balanced scorecard fails as: incorrectly identified non-financial variables; poorly defined metrics; improvement goals are negotiated rather than based on stakeholder requirements; lack of deployment system breaking high level goals down to the sub-process level; lack of improvement system; links between non-financial measures and expected financial results. Walker (1996) argues the limitation of the balanced scorecard metric as its static performance reporting in dynamic operation environment, and then he introduces dynamic management reporting which emphasizes flexibility and responding to changes in environment and strategy.

Key Performance Indicators

Key performance indicators (KPIs or key success indicators) measure the organisation operation process toward goals, and reflect the critical success factors of an organisation. Cox, et al. (2003) define KPIs in construction as “compilations of data measures used to assess the performance of a construction operation.... Can be either the quantitative results of a construction process, i.e. \$/unit, or by qualitative measures such as worker behaviour on the job (e.g. turnover, absenteeism, and motivation) (p.142)”. Key performance indicators are identified according to the organisational goals to provide important information following top-down process. Key performance indicators are developed according to the nature of industry. In construction, Construction Industry Task Force (1998) reports ten key performance indicators, including seven project performance indicators (namely construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product, and client satisfaction with the service), and three organisation performance indicators (i.e. safety, profitability and productivity).

Rodriguez, et al. (2009) argue the lack of further information to analyse the reason why the indicator fails to achieve the objective, and the relationships between indicators are not explained. Then they develop a framework (quantitative relationships at the performance management context) to find and quantify relationships between KPIs to provide additional information to decision makers.

Excellence model integrates the enablers during operation process and results (KPIs) to measure performance.

Excellence Model

Excellence model (Figure3-4) is developed by European Foundation for Quality Management (EFQM, 1999) to achieve organisational strategies and improve the overall quality of management. The excellence model distinguishes the results organisations achieved (what) and enablers of management (how). Generally, the enablers include leadership, people, policy and strategy, partnership and resources, and process; the results include people results, customer results, society results, and key performance results.

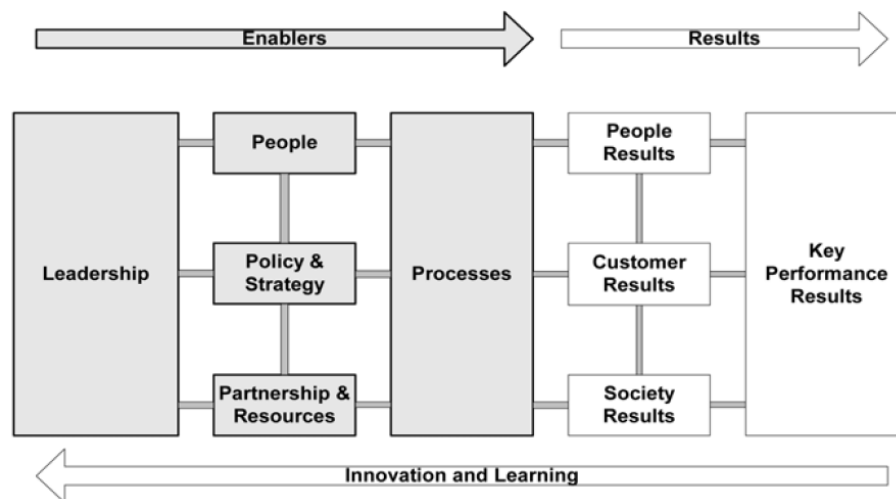


Figure 3- 4: The Excellence model
(Source: EFQM, 1999)

Neely and Adams (2001) argue that excellence model is a self-assessment rather than an objective measurement framework, the categories for measurement are broad, and the enablers are not readily measurable.

Critically, performance measurement should be grounded on information availability, reliability and responsibility (Gomes, et al., 2004). So, the information system should be established to track, store and manage useful information to facilitate the measurement, and can be transferred to organisational knowledge. The new direction of performance measurement is to help organisations achieve continuous improvement (Kumar, et al. 2009). After understanding the concept and measurement

of organisational performance, the scholars and practioners can benchmark the organisations which can deploy the best practices in their operation process (Barker, 1995). Construction project is multi-stakeholder organisations, and a complete performance measurement is vital to evaluate project performance and satisfy the stakeholders' needs to achieve project and organisational goals (Tang and Ogunlana, 2003).

3.3.3 Construction organisations' performance

The measurement of organizational performance in construction is investigated by various researchers. Luu, et al. (2008) integrate balanced scorecard and strengths-weaknesses-opportunities-threats matrix to identify and validate key performance indicators (KPIs), and then measure the performance of Vietnam contractors against the identified KPIs. Robinson, et al. (2005) review the implementation of the balanced scorecard and EFQM excellence model in large engineering organizations, and find the challenges in implementation of performance measurement models remain at procurement stages, including motivation for performance management, leadership and resource, communication mechanisms, measurement and data collection techniques and the role of knowledge management. Yuan, et al. (2009) establish the key performance indicators from five perspectives (i.e. physical characteristics of projects, financing and marketing, innovation and learning, stakeholders, process) to assess public-private partnerships projects.

Bassioni, et al. (2004, 2005) build a conceptual framework (based on balanced scorecard and excellence model metrics) for measuring business performance in construction from performance driving factors and performance results factors. The performance driving factors include: leadership; customer and other stakeholder focus; strategic management; information and analysis; people management; partnerships and suppliers management; resources management; intellectual capital management; risk management; work culture; and process management. The performance results factors include: people, partnership and supplier results; project results, customer and society results; and organizational business results. Basing on balanced scorecard metric, Kagioglou, et al. (2001) develop a performance

measurement conceptual framework, adding project and supplier perspectives, from strategy to performance. Toor and Ogunlana (2010) investigate the key performance indicators in a large construction project in Thailand, and find that safety, efficient use of resources, effectiveness, satisfaction of stakeholders, and reduced conflicts and disputes are perceived as important indicators except time, budget and quality.

Westerveld (2003) develops a project excellence model including results indicators (projects results, appreciation by the client, project personnel, users, contracting partners and stakeholders) and enabler indicators (leadership and team, policy and strategy, stakeholder management, resources, contracting, and project management).

Organizational performance is determined by various factors (e.g. environment forces, organizational structure, technology) and achieved through the aggregation of individual performances.

3.4 Individual behaviour

It is acknowledged that aiming to sustain its competitive advantage, the organisation needs to arouse not only employees' in-role behaviours (e.g. adopting occupational knowledge and abilities in task related performance), but their extra-role behaviours which go beyond their task requirements (e.g. helping colleagues, being proactive).

'Individual behaviour' and 'individual performance' are related concepts. For example, Sonnentag and Frese (2001) state individual performance has two dimensions as behaviour and outcome. Liu and Walker (1998) develop "behaviour-performance-outcome" cycle to explain and connect these three constructs; based on Naylor, et al. (1980), they define individual behaviour as an ongoing act or process with amplitude and direction dimensions; performance is determined by individual's ability and behaviour, and influenced by environmental and technological factors; and then performance is evaluated by its outcome. Similarly, Motowidlo, Borman and Schmit (1997) define job performance as "the aggregated value to the organisation of the discrete behavioural episodes that an individual performs over a standard interval of time (p.72)". And they assume job performance is behavioural, episodic, evaluative, and multidimensional.

Based on organisational role behaviour perspective, roles delineate expected behaviours, and for the foundation of job descriptions, expectations and stereotypes (Van Dyne, Cummings, and Parks, 1995). In the organization, individual behaviours include in-role behaviours and extra-role behaviours. Williams and Anderson (1991) define In-role behaviour as “the behaviour that is recognized by formal reward systems and is part of the requirements as described in job descriptions (p.606)”. Extra-role behaviour (or context behaviour) is defined as “behaviour which goes beyond specified role requirements, and is directed towards the individual, the group, or the organization as a unit, in order to promote organizational goals (Somech and Drach-Zahavy, 2000, p.650)”. However, in some situations (e.g. two supervisors have different standards and expectations for the site engineer), it could be blurred to clarify between in-role and extra-role behaviour (Morrison, 1994; Van Dyne and LePine, 1998; Kwantes, et al., 2008). The factors influencing the specific behaviour label as in-role or extra-role include (Van Dyne, et al., 1995): particularistic characteristics (the observer and the actor), relational characteristics (the specific relationship between the observer and the actor), and dynamic characteristics (changes in the actor’s perceived capability over time).

3.4.1 In-role behaviour

In-role behaviour (also called task behaviour or task performance) is recognized by formal reward systems, and its requirement is prescribed. Van Dyne, et al. (1995) give the definition as “the behaviour which is required or expected as part of performing the duties and responsibilities of the assigned role (p.222)”. Generally, employees’ in-role behaviours contribute to their jobs’ ‘technical core’ (e.g. design a building, making a project procurement plan). Citing from Campbell (1990), Sonnentag and Frese (2001) point out that task performance is a multi-dimensional concept with five factors: (1) job-specific task proficiency, (2) non-job-specific task proficiency, (3) written and oral communication proficiency, (4) supervision (in case of a supervisory position) and partly (5) administration.

Motowidlo, Borman and Schmit (1997) develop a theoretical model of individual differences in task and contextual performance (depicted in Figure 3-5): individual differences in terms of cognitive ability (including sensory-motor capacities, physical abilities, perceptual styles, learning ability, verbal ability and spatial ability) and personality (see ‘big five’: extraversion, agreeableness, conscientiousness, neuroticism, and openness, Srivastava, 2010), combining with learning experience, affect individual performance (as behaviour in this research) through their effects on characteristic adaptations in knowledge, skills and work habits. There are two different sets of knowledge, skills and work habit, i.e. task-related (in-role) and contextual (extra-role). Task knowledge, skills and work habits emphasize an organisation’s technical core which produces products (or services) or replenishes the supply chain; contextual ones enhance the organisational psychological climate in which the technical core is embedded (Motowidlo, et al., 1997).

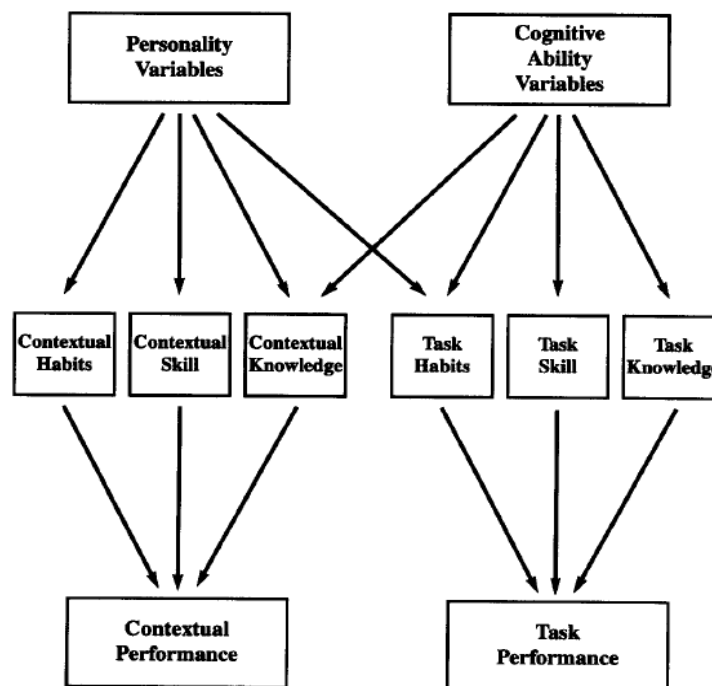


Figure 3- 5: A theoretical model of individual differences in task and contextual performance
(Source: Motowidlo, Borman and Schmit, 1997, p.79)

Except cognitive ability, Diefendorff, et al. (2002) find positive relationship between job involvement (defined by Paullay, et al. (1994, p. 224) as “the degree to which one is cognitively preoccupied with, engaged in, and concerned with one’s present job.”) and supervisor rated individual in-role performance ($r=0.19$, $p<0.05$). Similarly,

Rotenberry and Moberg (2007) report a positive correlation between job involvement and in-role performance ($r=0.15$, $p<0.05$).

Different from in-role behaviours, extra-role behaviours (or contextual performance) contribute to develop organisational, social and psychological climate in which in-role behaviours must perform (Borman and Motowidlo, 1993, e.g. helping co-workers to improve their productivity, providing suggestions about project management system optimization).

3.4.2 Organisational citizenship behaviour

Extra-role behaviour, which goes beyond role expectations but generally benefits the organisation, is a multi-dimensional construct. Van Dyne, et al. (1995) critically review extra-role behaviour and clarify four main specific extra-role behaviours: organizational citizenship behaviour (OCB, Organ, 1988), prosocial organizational behaviour (Brief and Motowidlo, 1986), whistle-blowing (Dozier and Miceli, 1985), principled organizational dissent (Graham, 1986). Podsakoff and MacKenzie (1997) suggest two more forms of extra-role behaviour as future direction, which are anti-citizenship behaviour (e.g. ignoring organisational rules, talking back to the supervisor, and selling firm information to rivals) and customer-oriented behaviour. OCB is the best known and most heavily researched extra-role concept, which is used to manifest the extra-role behaviour in this study.

Definitions and Dimensions of OCB

Organ (1988, p.4) defines OCB as “behaviour that is discretionary, not directly or explicitly recognized by the formal reward system, and in the aggregate promotes the efficient and effective functioning of the organization”. OCB goes beyond the enforceable requirement of the job description, and is clarified contingently on the job changing (Organ, 1997). The practical importance of OCB is that they improve organizational efficiency and effectiveness by contributing to resource transformations, innovativeness, and adaptability. Further, Organ (1997, p.91) redefines OCB to include behaviour that contributes to “maintenance and enhancement of the social and psychological context that supports task performance”.

One widely used conceptualization of OCB in literature review comprises of five dimensions (Organ, 1988): altruism, conscientiousness (or compliance), sportsmanship, courtesy and civic virtue. According to Organ (1988, 1990), *altruism* is characterized by acts which help a specific person or prevent the occurrence of job-related problems; *conscientiousness* is the behaviour indicating that employees accept and adhere to the rules, regulations, and procedures of the organization; *sportsmanship* is “a willingness to tolerate the inevitable inconvenience and impositions of work without complaining (Organ, 1990, p.96)” and characterized by maintaining a positive attitude; *courtesy* includes those gestures that help others to prevent a problem; *civic virtue* is characterized by responsible participation in the political life of the organization such as attending meetings and reading company mail. Organ (1990) adds two more dimensions of peacemaking and cheerleading. However, Podsakoff, et al. (2000) subsume dimensions of altruism, courtesy, peacemaking and cheerleading as part of a ‘*helping behaviour*’ dimension. And, Podsakoff, et al. (2000), after a comprehensive review regarding OCB concept, add two more dimensions: *organisational loyalty* (“spreading goodwill and protecting the organisation... essentially promoting the organisation to outsiders, protecting and defending it against external threats, p. 517”), and *self development* (employees engage in improving their knowledge, skills and abilities to expend contribution to the organisation).

Another major conceptualization of OCB, proposed by Williams and Anderson (1991, p.601-602), distils it down to two dimensions: “(a) OCBO-behaviours that benefit the organization in general (e.g. give advance notice when unable to come to work, adheres to informal rules devised to maintain order) and (b) OCBI-behaviours that immediately benefit specific individuals and indirectly through this means contribute to the organization (e.g. helps others who have been absent, takes a personal interest in other employees)”. This two-dimensional OCB is employed in the empirical research by Erturk (2007), Chiaburu and Baker (2006), Somech and Drach-Zahavy (2004), Dipaola and Tschannen-Moran (2001), and Skarlicki and Latham (1995).

The connections between different categorizations and dimensions of OCB have been investigated empirically by Hoffman, et al. (2007) and LePine, et al. (2002, defining

OCB as a latent construct). Hoffman, et al. (2007) extend previous meta-analytic reviews of OCB literature by using confirmatory factor analyses, and find that OCB dimensions altruism and courtesy served as manifest indicators of an OCBI factor, and the OCB dimensions generalized conscientiousness, sportsmanship and civic virtue served as manifest indicators of OCBO, which is consistent with Williams and Anderson's (1991) original concept. Thus, Williams and Anderson's two dimensions of OCBI and OCBO could capture all of Organ's (1988, 1990) OCB dimensions. According to Podsakoff, et al. (2009) who perform an exhaustive review, OCBI includes altruism, courtesy, peacekeeping, cheerleading, interpersonal helping, interpersonal facilitation, helping co-workers and interpersonal harmony constructs; OCBO includes compliance, civic virtue, sportsmanship, organisational loyalty, job dedication, voice behaviour, taking charge and promoting the company's image constructs. Because this research aims to investigate the effects of extra-role behaviour on organisational and co-workers performance respectively, Williams and Anderson's concept scheme of OCBI and OCBO provides clear constructs and is used in this study.

Antecedents of OCB

Van Dyne, et al. (1994) propose that personal factors (including positive job attitudes, e.g. satisfaction, and human nature, e.g. cynicism), situational factors (including perceptions of organisational values and perceptions of the motivating potential of employee jobs), and positional factors (namely organisational tenure and hierarchical job level) will influence OCB through the mediator of covenantal relationship (e.g. reciprocity and mutual commitment).

Podsakoff, et al. (2000), after a comprehensive literature review, summarize four major categories of OCB's antecedents: individual characteristics, task characteristics (e.g. task feedback, task routinization, and intrinsically satisfying tasks), organisational characteristics, and leadership behaviour. According to Organ and Ryan (1995), 'morale' factor (which underlying individual satisfaction, commitment, perception of fairness and leader supportiveness) and personality (e.g. agreeableness, conscientiousness, and positive affectivity) have significant relationship with OCB. Concerning individual characteristics, individual role perceptions (i.e. role ambiguity and role conflict) and indifference to rewards are also found relating to OCB

(Podsakoff, et al., 2000). Regarding organisational variables, based on the meta-analysis results, Podsakoff, et al., (2000, Table2) find that there is no relationship between organisational formalization, organisational inflexibility, staff support, and spatial distance and OCB; but, there are significant positive relationships between group cohesiveness and all of Organ's (1988) five dimensions of OCB, significant positive relationship between perceived organisational support and employee altruism, and significant negative relationship between rewards outside the leader's control and altruism, courtesy, and conscientiousness. In terms of leadership behaviour, Podsakoff, et al., (2000, Table2) find that transformational leadership behaviour and transactional leader behaviour, supportive leader behaviour, leader role clarification, and leader-member exchange significantly relate to OCB. The above review has discussed the antecedents of OCB, and the consequences of OCB are also investigated recently in various research (Podsakoff and MacKenzie, 1997).

Consequences of OCB

Podsakoff, et al. (2009) propose and find the relationship between OCB and individual outcomes through meta-analysis, including positive effects of OCB on managers' ratings of employee performance and reward allocation decisions, and negative effects on employee turnover and turnover intentions, and employee absenteeism. Even if OCB positively influence individual and organisational performance, the rewards related to OCB are indirect, uncertain and not guaranteed contractually by the formal reward system (Organ, 1997). Becton, et al. (2008) incorporate OCB into performance reward system to investigate the potential effects of rewarding OCB. The negative effects of rewarding OCB which they propose include: decreased occurrence of OCBs in intrinsically motivated employees; emotional dissonance leading to emotional exhaustion and burnout; and increased role conflict and overload.

According to Organ's (1988) conceptual definition, OCB could enhance organisational effectiveness when aggregated over time and people. Conceptually, Podsakoff, et al., (2000) summarize possible reasons why OCB can contribute to organisational success: "(a) enhancing co-worker and managerial productivity; (b) freeing up resources so they can be used for more productive purposes; (c) reducing the need to devote scarce resources to purely maintenance functions; (d) helping to

coordinate activities both within and across work groups; (e) strengthening the organisation's ability to attract and retain the best employees; (f) increasing the stability of the organisation's performance; and (g) enabling the organisation to adapt more effectively to environment changes (p.546)". Empirically, following the results of meta-analysis, Podsakoff, et al. (2009) find that: unit-level OCBs positively relate to unit-level performance, including unit productivity, efficiency, profitability and the reduction of cost; OCBs are positively relate to customer satisfaction and negatively related to unit-level turnover.

In conclusion, both in-role and extra-role behaviours (in terms of OCB) aim to produce positive effects on organisational goal accomplishment.

Previous literature review has discussed and explained the four main constructs in this research, including HR practices, organisational learning, organisational performance and individual behaviour. According to the theories reviewed (namely general system theory, resource-based view and organisational role behaviour perspective) in Chapter2, research framework is developed in the next section.

3.5 Research framework

According to the literature review of theories and main constructs, the conceptual framework is illustrated in Figure 3-6. The context of this study is Chinese construction state-owned enterprises (SOEs) which operate within the environment of the Chinese construction industry. According to Cheah, Kang, and Chew(2007), the environmental forces which influence Chinese construction companies' operation include: government intervention, (immature) regulatory and legal systems, market structure, operating conditions, characteristics of market segments and regions, (inefficiencies and irregularities of) procurement systems, and entry to the World Trade Organization (WTO).

With the support of general system theory, the internal elements in the organization interrelate and interact under the environment forces according to its strategy. When the corporate strategy is formulated after auditing the external opportunities and

threats and internal strengths and weaknesses, HR strategy should also be adjusted and integrated into the corporate strategy.

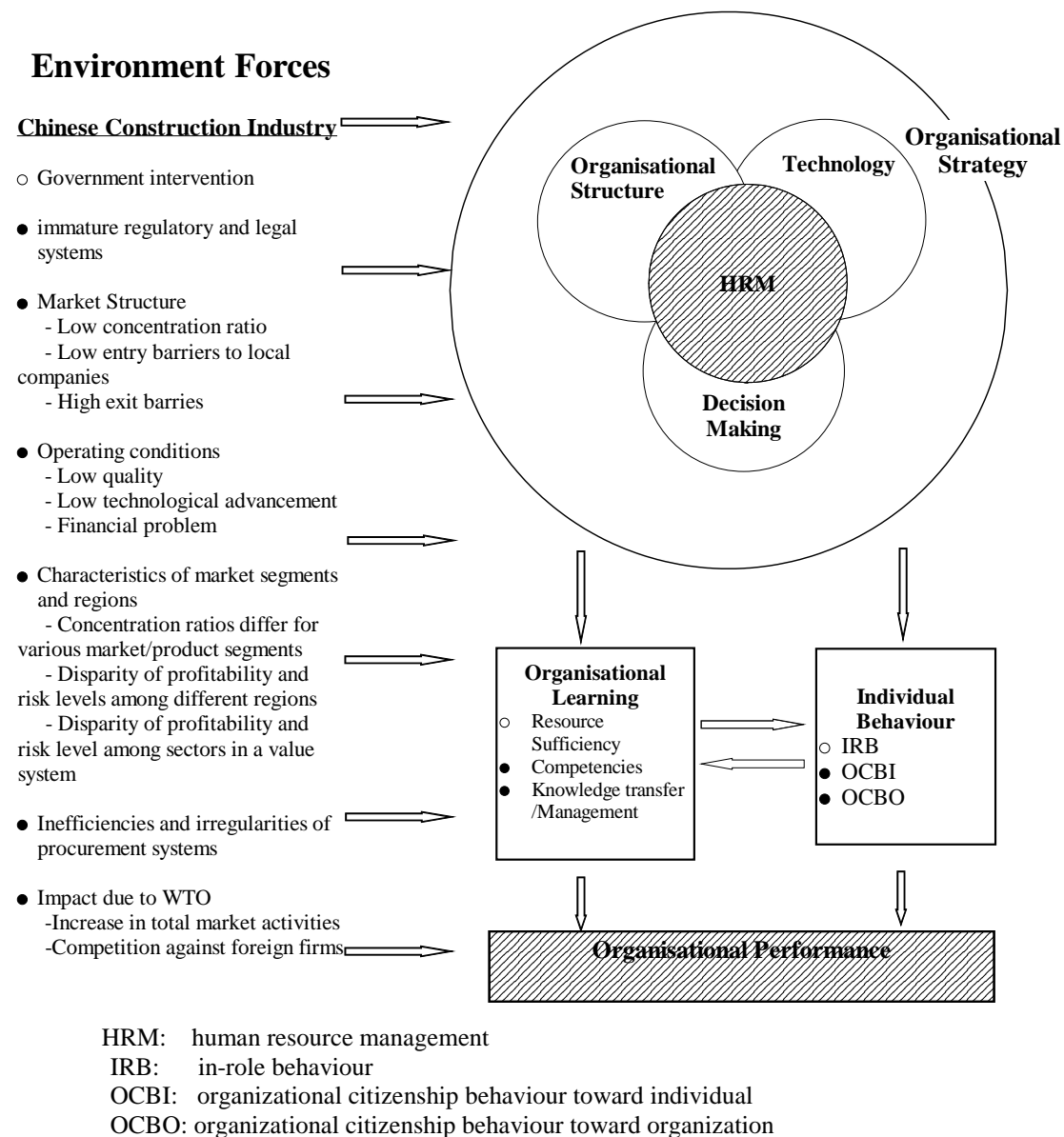


Figure 3- 6: Conceptual Framework to investigate effects of HRM on organizational performance

Organizational structure describes the formal reporting relationships and the allocation of tasks, roles and responsibility of individuals in the organisation. From the role-behaviour perspective, HR management provides the organization with its primary means for sending role information through the organization, supporting desired behaviours, and evaluating role performances (Wright and McMahan, 1992; Jackson and Schuler 1995). In-role behaviour is the most important aspect of

individual behaviour in the organization, because it contributes to the job's 'technical core'. OCB, discretionary and not directly recognized by the formal reward system, provides organisational and social environment in which in-role behaviour performs, and in the aggregate promotes the efficiency of the organization. Proper use of HR practices can enhance employees' in-role behaviour and motivate their OCB.

From the resource-based view, human resource is a value-added source of sustainable competitive advantage which will improve organizational performance (Wright, et al. 2003; Huselid, et al. 1997; Wolfe, et al. 2006). Organizational learning is the process to acquire, share, interpret and reuse the knowledge; HR management supports the organisational learning process in developing specific knowledge for continuous development, and organisational performance improvement. The elements and links within the Framework are discussed in this section in the context of Chinese construction SOEs.

Environment forces

Based on system theory, the organisation operates in a dynamic environment and is affected by the environment forces (Checkland, 1981; Sirmon, et al., 2007).

Understanding the 'fit' between environmental contingencies and organisational internal operation systems (e.g. strategies, organisational structure, and learning direction) may lead to greater success (Toh, et al., 2008).

Consistent with China's transition from planning economy to socialist market economy, construction industry in China has experienced continual changes to fit the environment. For example, Yao, et al. (2001) report the industry has set up some new mechanisms to manage construction process, including new bidding procedure, supervision system and contract management systems. According to Cheah, et al. (2007), however, Chinese government's 'invisible hands' sometimes still plan, supervise and control the construction process, and the legal and regulatory system is still immature. Kang (2006) analyses Chinese construction industry and explains the following findings. Regarding the market structure of the construction industry, its concentration ratios from 1999 to 2001 are 5.85%, 4.97% and 5.2% respectively, which is low (<25%) and means that the market is extremely competitive; the entry barriers are low to potential competitors; but the exit barriers are high because of the

difficulty to sell assets, lack of legislations to bail firms out of construction industry, and political reasons formed by immature economy systems. For operating conditions, the concentration ratio of high quality project is low, which is about 30-40% from 1992 to 2002, and negative correlation between high quality project and pre-tax profit margin (-0.328 , $p \leq -0.1$); technology advancement is low manifested by the value of machines per labour and labour productivity compared with developed countries; and he argues several financial problems, such as lack of bank credit facilities/loans, payment delay caused by the clients, and low asset efficiency (about 0.9 from 1999 to 2003 compared with large international contractors which is greater than 1.0). In terms of related horizontal and vertical markets conditions, different competitions appear in various construction sectors (e.g. the concentration ratio of buildings is 0.43, which in railways, highways, tunnels and bridges is 9.92 and in dams, power plants and ports is 13.41); disparity of output growth, risk level and profit margin occurs among different geographical regions; and there is disparity of profitability and risk levels among different sectors in the value system (e.g. engineering and design, construction equipment, general contractor). Finally, Kang (2006) concludes that the project procurement system is inefficient and irregular.

The industry structure barrier may affect the degree of competitive rivalry (Sirmon, et al., 2007). In line with China's accession to the World Trade Organization, domestic contractors have to compete with the foreign construction companies (Zhao and Shen, 2008). Within the dynamic and uncertain environment, organisations need to set up strategies to adapt to environmental change to survive in the market.

Strategy

After identifying the organization's current position and core competencies to deal with changes, auditing the opportunities and threats within the external environment (including industry, market, competitor), and evaluating strengths and weaknesses of the internal organization, the organisation formulate its strategy to determine and choose its future courses of actions (Price and Newson, 2003). Strategy is defined by Johnson and Scholes (2002) as "the direction and scope of an organization over the long term: which achieves advantage for the organization through its configuration of resources within a changing environment, to meet the needs of markets and to fulfil stakeholder expectations". Three dimensions of real-life strategic problem situation

are recognized (De Wit and Meyer, 2004) as process (strategic analysis, formation and implementation), content (i.e. scope of organizational activities, mobilization of organizational, and normative character), and context (namely organizational environment in which the process and content is embedded). Miles and Snow (1984) identify four types of organisation as defender, prospector, analyser and reactor.

Porter (1985) identifies three generic strategies for achieving above-average performance in an industry as: cost leadership, differentiation, and focus. According to Price and Newson (2003), strategic change must consider physical and behavioural changes. Physical changes include organizational structure, management systems, policies and procedures, action plans, short term budgets/resources allocation, and information system, etc.; behaviour changes include value given to quality, excellence, communication, innovation, and employee participation.

Although construction industry has developed long-established and well-known technology, the dramatic changes of construction environment still require construction organisations to perform strategic analysis to improve their performance (Junnonen, 1998; Price, 2003; Cheah and Garvin, 2004; Price and Chahal, 2006). Price (2003) emphasizes the importance of strategic process development, and suggests the improvement of internal and external audits and application of appropriate tools and techniques during strategic analysis process. Cheah and Garvin (2004, p.179) develop a framework to develop a construction company's strategy from seven fields including financial, HR, business, operational, Information Technological, marketing and technology. According to the operation environment (i.e. highly competition, low entry barriers, and high exit barriers), Chinese construction companies prefer to adopt differentiation (e.g. unique service perceived by the clients and distinguished from their competitors) and market/product diversification strategies (entry to the low competence sector, such as dams, power plants, railways and tunnels) to improve their performance (Kang, 2006; Cheah, et al., 2007). Strategy is implemented by translating the strategy into action through organizational structure, resource planning and the management of strategic change (Johnson and Scholes, 2002).

Strategy and Structure

The successful implementation of a new strategy requires a new or at least refashioned structure to operate efficiently. Structure is defined by Chandler (1969) as the design of organization through which the enterprise is administered, including formal and informal aspects. Naoum (2001) further defines it as “a mechanism for linking and co-ordinating people and groups together within the framework of their roles, authority and power”. In detail, Daft (2007, p.90) gives three components of organization structure from both vertical and horizontal aspects of organizing: (1) formal reporting relationships, including the number of levels in the hierarchy and the span of control of managers and supervisors; (2) the grouping identified together of individuals into departments and of departments into the total organization; (3) the design of systems to ensure effective communication, coordination, and integration of efforts across departments. Structure has been recognized from three dimensions of centralization, formalization, and complexity (Van de Ven, 1976).

Conceptually, the contingency relationship between organizational strategy and structure are discussed by several scholars (Hall and Saias, 1980; Greenwood and Hinings, 1988; Hoskisson and Johnson, 1992; Matten, 1995). Chandler (1969) states that strategies result in the complex type of structure (e.g. expansion of volume, geographical dispersion, of vertical integration and diversification). Hall and Saias (1980) argue that structure follows strategy but equally that strategy follows structure. Then, Amburgey and Dacin (1994) find strategy is a more important determinant of structure than structure is of strategy, as they say “strategy and structure do follow one another as the left foot follows the right – but they do not have equal strides (p.1449)”. Organisational structure can impact on strategy through its effect on strategic decision making process (i.e. the process involved in formulating a company strategy, Fahey, 1981).

Operationally, Miller (1987) finds that intended rationality in strategy making (in terms of analysis and interaction) may require formalized and integrated structures but not centralized structure. Similarly, Fredrickson (1986) argue that rationality in strategic analysis process have strong associations with three aspects of structure formalization (namely controls, formalization, and specialization). Whereas, innovation strategy needs decentralization of power and high degree of role specialization, because innovation activities need frequent discussion from different

departments, experts in different functional areas are needed to perform a broad array of innovation-related tasks, e.g. research and developing, engineering, and marketing (Miller, et al., 1988).

Strategy and HR management

Over the years, scholars and practitioners have agreed that HR management plays an important role in strategy implementation and should be aligned with the organizational strategy (Miles and Snow, 1984; Schuler, 1992; Wright and Snell, 1991). There are two sub-streams link from the macro (HR function and strategy) and micro (individual HR practices) aspects. In the macro sub-stream, Schuler (1992) proposes a '5-P model' to link strategic HR activities (i.e. HR philosophy, policies, programs, practices, and processes) with strategic business needs. Wright and Snell (1991) view the HR system from an open system perspective, which includes input (HR competences: knowledge, skills, and abilities), throughput (HR behaviours), and output (affective outcomes and performance outcomes). Following the HR open system, Wright and McMahan (1992) discuss the strategic HR management from cybernetic models, within which strategy influences input and throughput of HR system, and be influenced by the output. Lengnick-Hall and Lengnick-Hall (1988) propose the reciprocal linkage between strategy and HR strategy, which posit the potential effects of HR strategy on organisational competitive strategy. Concerning the organizational strategic change, HR management should be changed simultaneously with the strategy (Purcell, 1999; Burton, et al., 2004). In this situation, the function of HR management is to ensure internal environment of organization is amendable to change and learning (Connell and Waring, 2002; Truss, et al., 2002). Comprehensively, Wright and Snell (1998) develop a framework to explore the fit in strategic HR management from three conceptual variables of HR practices (micro sub-stream), employees' skills and employee behaviours.

In the micro sub-stream link, Schuler and Jackson (1987) argue that different competitive strategies may employ different HR practices to obtain the required role behaviours. Such as, in an attempt to gain innovation strategy, compensation would emphasize internal equity rather than external or market-based equity, and appraisals are more likely to reflect longer-term and group-based achievement; pursuing cost-reduction strategy will minimise employee training; in attempting to gain quality-

enhancement strategy, the organisation will likely have explicit job descriptions. From another perspective, Miles and Snow (1984) argue that defenders usually develop their own human resource through training and internal promotion; prospectors prefer to acquire human resource through recruitment; and analysers pay attention on human resource planning.

Empirically, however, Delery and Doty (1996) show the weak effects of strategy on HR systems. Khatri (2000), using a sample of 200 largest organisation from all major industries in Singapore, finds that strategies moderate the link between HR practices and organisational performance, 'prospector' adopts more performance-based compensation than the other three types, but the amount of HR practices (including employee participation, HR planning, selection and training) rarely varies with the strategy.

Overall, Khatri (2000) finds the strategy affects HR practices, which is consistent with the Miles and Snow' (1984) assumptions. Hence, HR strategy and practices are formulated based on the fully understanding the organisation's strategy.

Strategy and technology

Jackson and Schuler (1995) refer technology as "a system's processes for transforming inputs into usable outputs with many dimensions, including the degree of continuity in the production system, the types and levels of knowledge required by the system, the degree to which tasks are routinized and predictable, and the linkages and interdependencies among tasks and people (p.244)". Scott (1992) identifies three dimensions of technology as complexity, uncertainty and interdependency.

Organisational strategy can direct the adoption of specific techniques and technology to improve the organisational effectiveness, and the development of technology (e.g. product innovation, optimization of procurement system) could also impact the formulation of new strategies, which is through the strategic decision making process.

Strategy and decision making

Fahey (1981) describes decision making as "a complex, multi-organisational level phenomenon, with many individual decisions simultaneously in process (p.58)". Decision making process has two dimensions (Fahey, 1981) of analytical/rational

(comprehensive, step-by-step procedures to make decisions) and behavioural/political (dynamics of interactions among employees and firm units). Fredrickson (1986) identifies six characteristics of strategic decision process including: process initiation, the role of goals, the means/ends relationship, the explanation of strategic action, the comprehensiveness of decision making, and comprehensiveness in integrating decisions.

The type of strategy may affect the decision making process. According to Miller, Droge and Toulouse (1988), the more a firm engages in product innovation, the more complex its decision-making task and the greater the incentive for information processing (i.e. analysis and interaction). Simultaneously, the more analytical and interactive the strategy-making process, the greater the possibility of discovering opportunities for innovation, and the more effective the process of resolving the problems (like innovative design).

The interdependent relationships among HR management, structure, technology and decision making process

When the strategies are formulated, organisational variables (i.e. HR management, structure, technology and decision making process) interrelate and interact with each other to implement these strategies (Jackson and Schuler, 1995). There are several models presenting the interdependence of organisational variables, such as: Leavitt and Bahrami's (1988) Diamond model (the relationships between structure, technology, people, and control mechanisms), McKinley's 'Seven S's' model (seven components in terms of structure, systems, style, staff, skills, strategy, and shared values, Peters and Waterman, 2004, p.11), and Weisbord's six-boxed model (including purpose, structure, rewards, helpful mechanism, relationships, and leadership, Weisbord, 1978, p.9).

Organisation structure affects strategic decision making, and there is association between decision making process characteristics and different types of structures (Fredrickson, 1986). For example, decisions are more likely made as the result of proactive, opportunity seeking behaviour when centralization of structure increases; the decision making process is monitored in a formal structure organisation; and the integration of decisions would be lower in a more complex structure organisation.

The link between structure and technology in construction is explained by Walker (2002) in three aspects: (1) where highly complex technology is involved, there will be more structural complexity and increased professionalization; (2) uncertain technology may lead to lower formalisation and decentralisation in decision making; and (3) the interdependency of technology (together with complexity and uncertainty) would require high levels of coordination.

Truss and Gratton (1994) propose that internal organisation-level variables (technology, culture, philosophy and management style, structure) influence the relationship between organisational strategy and HR strategy. Consistent with general system theory, the adoption of specific HR practices should consider the structure, technology, and decision making process (Jackson and Schuler, 1995).

Formal organisation structure specifies employees' roles and work flow which deploy the arrangement of tasks and responsibilities, and show the relationships of the employees. The managerial hierarchy would affect personal control in the organisation. Toh, et al. (2008) find five bundles of HR practices which tend to fit with organisational structure. For example, commitment maximizers are higher in mechanistic structure in terms of work flow standardization, formalization, and hierarchy. Jackson and Schuler (1995) argue that the team-based organisation (like construction company) needs to consider the HR practices (e.g. job analysis, recruitment, socialization activities) to fit its structure.

Technology are the tools used by employees to produce outputs (e.g. construct a building). The results and quality of technology implementation depend on the employees' knowledge and skill (Walker, 2002). For example, in construction site, the project (requiring new techniques) cannot be completed without qualified engineers. So, technology application (e.g. new construction method) connects with qualified staff recruitment and training. Snell and Dean (1992) find that the adoption of advanced technology may directly influence HR practices, e.g. selection, comprehensive training, developmental appraisal, and compensation. Jackson, et al. (1989), from the role behaviour perspective, explain that the organisation with

advanced technologies and flexible specialization is more likely to adopt performance-based appraisal and training.

From resource-based view, HR practices can foster organisational learning to yield competitive advantage (Lado and Wilson, 1994).

Organisational learning

In the organisational level, in order to implement the strategies and manage the environment changes, Cyert and March (1963) propose that organisational learning is a part of decision making concerning the rules, procedures, and routines in response to external forces. Theoretically, based on resource-based view, organisational learning (be sufficient) can be resources to provide a potential capability and competency for strategic flexibility and adapting to the environmental changes (Grant, 1996). Organisational learning is also viewed from five perspectives in terms of individual learning, process, culture, knowledge management, and continuous improvement (Wang and Ahmed, 2003). So, the organisation which has ability to learn is called a 'learning organisation' (Senge, 1990), where organisational internal constructs (see HR management, structure, decision making and technology) may interdependently affect or facilitate the dynamic process of organisational learning (i.e. creation, acquisition, dissemination, integration, assimilation and utilization of knowledge). For example, HR practices of training and rewards can elicit individual learning behaviour to acquire new knowledge and develop organisational learning culture, participation and communication of individuals may motivate knowledge sharing activity to distribute and integrate knowledge. Organisational structure relates to employees' co-ordinating and work flow arrangement (including employees' roles, authority and power) which influence the interaction among individuals, and then may affect knowledge creation, transfer and integration, depending the structure's formalization and complexity. To some extent, a new decision is made according to its situation, existing individual and organisational knowledge, and the new analysis method and experience can be integrated and stored in the organisational memory. At the same time, the more complex and uncertain the technology, the more activities the organisation need to employ to elicit and motivate its employees to learn; the more interdependent the technology, the more communication and knowledge sharing

between employees. Individual behaviour is important in organisational learning because of the individual thinking and activity in knowledge creation (Grant, 1996).

Individual behaviour

In the individual level, the implementation of strategies (HR practices, structures, technologies, and decision makings) depends on employees' behaviours, including not only their skills, knowledge and abilities for specific jobs (in-role behaviours), but also their extra-role behaviours to work with others in a social environment (Katz and Kahn, 1978; Williams and Anderson, 1991). Extra-role behaviour is manifested by OCBI and OCBO in this study. Different strategies require various role behaviours (Schuler and Jackson, 1987). Formal organisational structure allocates task requirements according to the role description, and informal structure may affect the individuals' attitude to perform extra-role behaviour (Chandler, 1969; Naoum, 2001). HR management is the organization's primary means for sending role information through the organization (i.e. role making process), supporting desired behaviours, and evaluating role performances (Solomon, et al., 1985; Evans and Davis, 2005). In consequence, the aggregate of individual behaviours contribute to organisational performance improvement over time and people.

In sum, all the efforts organisations paid are to achieve their organisational goals and ensure their performance improvement and continuous development. This chapter has discussed the literature review of four main constructs firstly (namely HR management, organisational learning, individual behaviour and organisation performance), and then developed research framework (based on the theories in Chapter 2) considering the effects of environmental forces and organisational internal variables (i.e. strategy, structure, technology, and decision making process) on the formulation of HR strategy and practices, all of which may affect the level of organisational learning and individual behaviour to improve the organisational performance. Based on the research framework, empirical models and hypotheses in Chapter 4 focus on the effects of HR practices on organisational learning and individual behaviour (including in-role behaviour and OCB) to improve organisational performance.

Chapter 4 Research Design and Methodology

In order to achieve the research aim and objectives, according to the theories in Chapter 2 which help to predict and understand the empirical world, and literature review and conceptual framework developed in Chapter 3, research models and hypotheses are postulated. Then, the methodology (mixed method) and research design are explained and developed in this chapter.

4.1 Research models and hypotheses

Because the instruments used in this research are from previous studies which mostly produce in the context of Western countries (Tsui, 2006), **Objective 1** is to justify the implementation of construct measurement instruments in the context of Chinese construction SOEs, see the scales to measure organisational learning, individual behaviour (including in-role behaviour and OCB), HR practices, and organisational performance. In order to develop Chinese version measurement scales, four participants (two academic researchers and two industry experts who are industry-based and have over 20 years work experience) are asked about their understanding of the instruments, and whether the content of the instruments are consistent with the definitions and meanings of the constructs and whether there are items ambiguous or difficult to answer, to confirm the scales' content validity. Then, the instruments are improved and refined according to the participants' suggestions and characteristics of the specific context of Chinese construction SOEs (refers to section 4.3). In main survey, the large sample-data are collected, and exploratory and confirmatory factor analysis are employed respectively to test the construct reliability and validity, and to confirm the usability and workability in quantitative analysis, which are shown in Chapter 5.

Objective 2 of this research is to examine the influences of HR practices on employees' behaviours and organisational learning. From the resource-based view, human resource is a value-added source of sustainable competitive advantage, which will improve organizational performance (Wright, et al., 2001; Huselid, 1995). There

are several outstanding empirical works which have found the positive relationship between HR practices and organisational performance in the last 15 years (e.g. Arthur, 1994; Huselid, 1995; Huselid, et al., 1997; Way, 2002; Guest, et al., 2003; Wright, et al., 2005; Li, et al., 2006; Tseng and Lee, 2009). However, few studies have addressed the process (like a black box) to explain why and how human resource management leads to organisational performance (Becker and Gerhart, 1996; Ferris, et al., 1999; Bowen and Ostroff, 2004). From organisational role behaviour perspective, individual employees who possess the tacit knowledge to satisfy their task requirements and achieve the project goals are the essential resource of the Chinese construction enterprises. HR practices (e.g. training and intrinsic rewards) may influence and shape individuals' skills, attitudes, and behaviours in task performance to enhance experience and organisational capability. At the same time, based on knowledge-based view (Grant 1996), the employment of human resource management improves organizational learning, which increases organisational capability and, in turn, improves organizational performance. Hence, **Hypothesis 1** is:

HR practices enhance organisational performance through their influences on employees' behaviours and organisational learning.

Previous studies show that the proper use of HR practices enhances employees' in-role behaviour and OCB. Zhang, Wan and Jia (2008) provide evidence that high-performance HR practices have positive effects on OCB in the sample of 139 small-to-medium-sized Chinese biotechnology enterprises.

In-role behaviour is the most important aspect of individual behaviour in the organization, and is the most widely used indicator for the supervisor to evaluate employees' task performance -- when the employees' in-role behaviours achieve the role expectation. Theoretically, OCBs, in aggregate, might enhance organizational performance according to its conceptual definition (Organ 1988; Podsakoff, et al. 2000, Podsakoff, et al. 2009). A number of empirical studies (Dunlop and Lee 2004; Koys 2001) have investigated the relationship between OCB and organizational performance which provide evidence of various OCB dimensions predicting organisational performance in different contexts, e.g. Koys (2001) finds that OCB has an impact on profitability, but not on customer satisfaction in the service sector. Walz

and Niehoff (2000) provide the evidence that OCBs are positively predictive of the organizational effectiveness (in terms of cost, revenue, operating efficiency, customer satisfaction, quality and few customer complaints) in the sample of 30 restaurants. Similarly, Podsakoff and MacKenzie (1994) examine the effects of OCB (sportsmanship, civic virtue and helping behaviour) of 116 agencies in a major insurance company on organizational performance, and find that 17% variance in overall unit performance is accounted for by OCBs.

Sun, et al. (2007) analyze the multilevel data from hotels in China, which reveals that service-oriented OCB partially mediate the relationship between high-performance human resource practices and both performance indicators of productivity and turnover. So, **Sub-Hypothesis 1a** is (depicted in Figure 4-1):

HR practices enhance organisational performance through their positive influences on employees' in-role and extra-role behaviours, i.e. in-role and extra-role behaviours are mediating variables of the relationship between HR practices and organisational performance.

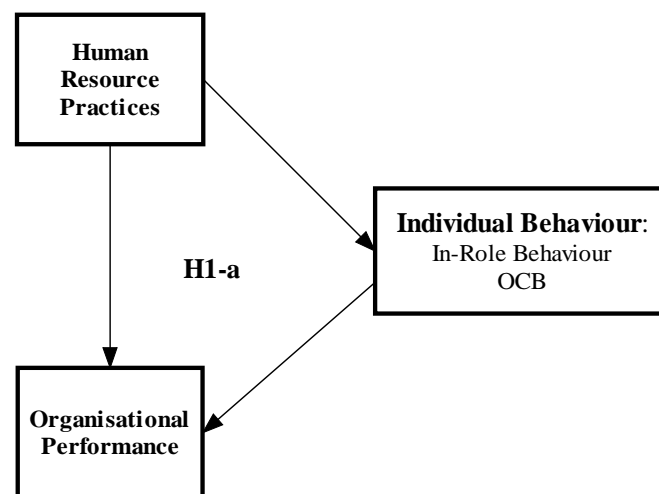


Figure 4- 1: The mediating effect of individual behaviours on the relationship of HR practices and organisational performance

From organisation internal resource perspective, HR practices play a significant role to achieve organizational learning (Soliman, and Spooner 2000) and organisational learning has a positive effect on performance (Bontis, et al. 2002; Lopez, et al. 2005). Theoretically, for example, the recruitment can help firms to attract qualified applicants who have required qualifications and new skills which can fill the

knowledge gap. Training can provide staffs new skills and knowledge, and develop the learning culture among working environment. Appraisal and reward can promote employees' creativity in their work and stimulate their learning attitudes to acquire new knowledge. The team-based reward policy may elicit and reinforce the communication and cooperation between team members, which will improve the distributing and integrating of knowledge. Through participation practice, employees are provided opportunities to share knowledge with their colleagues.

Empirically, Minbaeva (2005) finds that the employment of HRM practices (staffing, training, promotion, compensation and appraisal) affect knowledge receivers' ability and motivation which, then, positively relate to the degree of knowledge transfer but the effect of corporate socialization mechanisms and flexible working practices is insignificant. Similarly, Lopez, et al. (2006) find positive relationships between selective hiring, training, employee participation and organization learning but, organizational learning is not influenced by reward systems.

Bontis, et al. (2002) find a positive relationship between the stocks of learning at all levels and business performance, and the misalignment of stocks and flows in an overall organizational learning system is negatively associated with business performance. There is also a positive relationship between organizational learning and both innovation and competitiveness and economic/financial results (Lopez, et al. 2005). In the construction sector, Styhre, et al. (2004) examine six Swedish construction projects and find that learning capabilities in construction projects rely on informal and personal contacts rather than technical and formal systems.

HR configurations and organizational performance is mediated by human capital (employee's knowledge, skills and experience), organizational capital (institutionalized knowledge and codified experience) and social capital (knowledge resources embedded within, available through, and derived from networks of relationships) (Youndt and Snell 2004). This is supported by Collins and Smith's (2006) findings from 136 high-technology companies that HR practices affect social climate (trust, cooperation, shared codes and languages) which facilitate knowledge exchange and combination, and then enhance firm performance. Similarly, Liu, Hall and Ketchen (2006) perform meta-analysis to investigate how HR practices affect

organizational performance and find that the relationship is mediated by employee's knowledge, skill and abilities, empowerment, motivation and social structure.

According to Chen and Huang's (2009) investigation of 146 Chinese firms in Taiwan, strategic HR practices are positively related to knowledge management capacity which, in turn, has a positive effect on innovation performance. So, **Sub-Hypothesis 1b** is (depicted in Figure 4-2):

HR practices enhance organisational performance through their positive influences on organisational learning, i.e. organisational learning is a mediating variable of the relationship between HR practices and organisational performance.

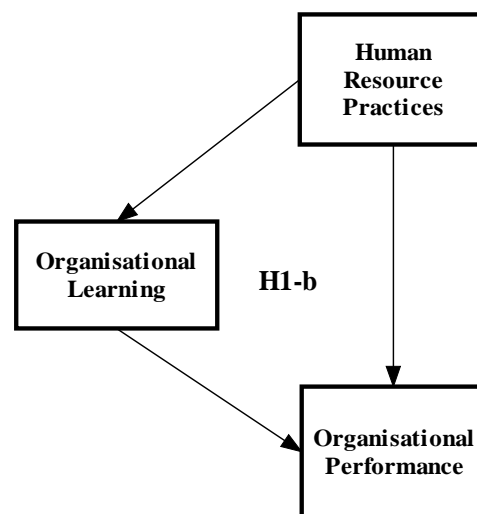


Figure 4- 2: The mediating effect of organisational learning on the relationship of HR practices and organisational performance

Objective 3 of this research is to examine the relationships of employees' behaviours and organisational learning and their impact on organisational performance. Since human resource management aims to support the organisational learning process in developing firm-specific knowledge and skills, organisations motivate their staffs using a number of interdependent human resource policies and practices. Practices are changing rapidly in line with China's economic development which includes the way people behave in performance of their roles and functional tasks. Their behaviours, in-role and extra-role, may be affected by *or* have an impact on organisational learning process in terms of knowledge acquisition, sharing and usage, which, ultimately, affect performance in organisations. There are few studies investigating the

relationship between organisational learning and individual behaviour. Somech and Drach-Zahavy (2004) find that OCBO is positively related both to organisational learning structures (i.e. structures and procedural arrangements to collect, analyse, document and disseminate information) and learning values (in four dimensions of valid information, transparency, issue orientation and accountability), and OCBI is positively related to learning structures only.

Hence, Hypothesis 2 is postulated as:

Employees' behaviours mediate the relationship between organisational learning and performance and such behaviours are influenced by human resource practices.

Figure 4-3 depicts the conceptual model for testing the possible mediating effects of employees' behaviours on the relationships of HR practices, organisational learning and performance in Chinese construction SOEs. And the directional relationship in H2 is tested in qualitative study in Chapter 6.

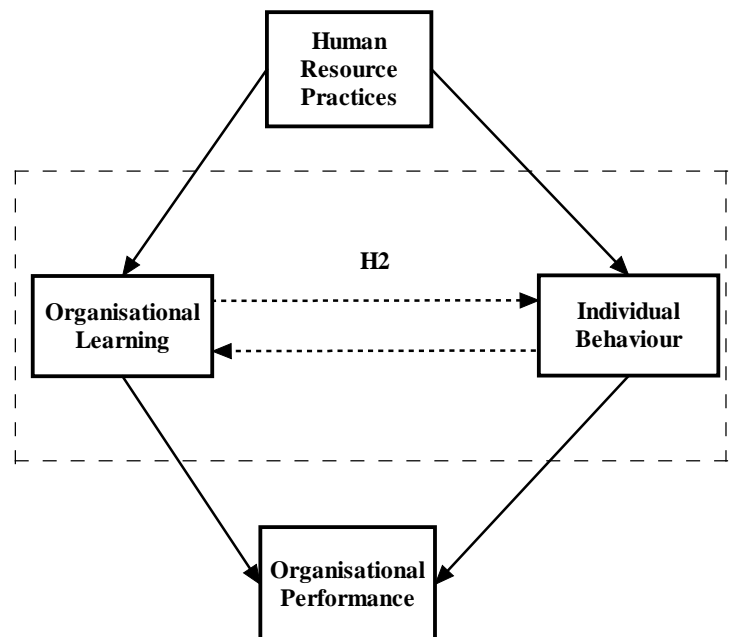


Figure 4- 3: The possible mediating effects of individual behaviours between organisational learning and performance, and such behaviours are influenced by HR practices.

4.2 Methodology

The adoption of mixed methods (Quan - Qual) approach stems from the view of science philosophy. Generally, quantitative method (i.e. deductive approach) is based on positivism ideal (relates to objectivism position) which advocates the researchers apply science methods to discover the truth. On the contrary, qualitative method (i.e. inductive approach) emerges from interpretivism position (relates to constructivism position) which asserts the phenomenon is accomplished by the actors and believes that the reality can only be interpreted. The posit of paradigm purity and incompatibility between quantitative and qualitative approach has been argued and progressed by another paradigm (i.e. pragmatism, Howe, 1988) which combines and integrates both approaches in one single research (Erzberger and Prein, 1997; Johnson and Onwuegbuzie, 2004). But the aim of 'pragmatism paradigm' is not to replace either of the approaches (i.e. positivism and interpretivism). The examples of empirical research using mixed methods approach can be found from Lopez-Gamero, et al. (2008), and Jones and Sumner (2009).

It is suggested that mixed methods (Quan - Qual) approach is to be adopted (e.g., see Creswell 2003; Fellows and Liu, 2003). Generally, the quantitative approach typically uses random sampling, structured interviews to collect data, and analyzes data using statistical techniques; by contrast, the qualitative approach typically uses purposive sampling, semi-structured or interactive interviews to collect data, mainly relating to people's judgment, preferences, priorities, and/or perceptions about a subject, and analyzes data through sociological or anthropological techniques. Mixed-methods approach provides opportunities to acquire multiple sources of data from different data collection methods (e.g. questionnaire survey and less structure interview in this study), reduce the potential bias by one particular method, help to discover potential mechanisms by comprehensive measurement, and then produce a more comprehensive empirical work (Axinn and Pearce, 2006).

The methodological debate between qualitative and quantitative researchers in construction management also proposes the possibility of methodological pluralism and paradigm diversity (Seymour and Rooke, 1995; Harriss, 1998; Dainty, et al., 2000; Rooke and Kagioglou, 2007). The mixed method exploits the strengths and

minimize the weaknesses of both in single research studies. Chau, et al. (1998, p.102) state that “the interpretative approaches used to investigate construction management provide useful information for identification and conceptualization of the problem, which subsequently may be theorized and subject to further investigation”.

A research study with mixed methods approach involves both quantitative and qualitative data collection and analysis. Creswell (2003, p.211) identifies four criteria to convey a mixed methods strategy (i.e. data collection and analysis), which include:

- (1) Sequence of the quantitative and qualitative data collection (i.e. concurrently or sequentially);
- (2) Priority of quantitative and qualitative data collection and analysis (i.e. equal or priority);
- (3) The stage to integrate the quantitative and qualitative data and findings;
- (4) The adopting of an overall theoretical perspective (i.e. explicit or implicit).

Based on the hypotheses and models postulated, the draft questionnaire instruments are developed from previous studies, and then the pilot study improves the understanding of instruments which are adopted in the following quantitative data collection. In this study, the quantitative and qualitative data collection is concurrent, but quantitative data collection is given a priority. Following the test to confirm the implementation of measurement instruments in the context of Chinese construction SOEs (i.e. Objective 1), quantitative data analysis is done by structural equation modelling (SEM) to examine the influence of HR practices on employees' behaviour and organisational learning, which may affect organisational performance (i.e. Objective 2); then, qualitative data analysis is employed by cognitive mapping to find the complex cause-effect relationships between organisational learning, individual behaviour and their impact on organisational performance (i.e. Objective 3); finally, the cause-effect routes captured from the qualitative results (i.e. the cognitive map) are tested by SEM again, which is followed by the discussion and implication. The simplified data analysis sequence is ‘quantitative – qualitative – quantitative’. The whole research map is depicted in Figure 4-4. The detailed application process of mixed methods approach in this research is explained in the following part.

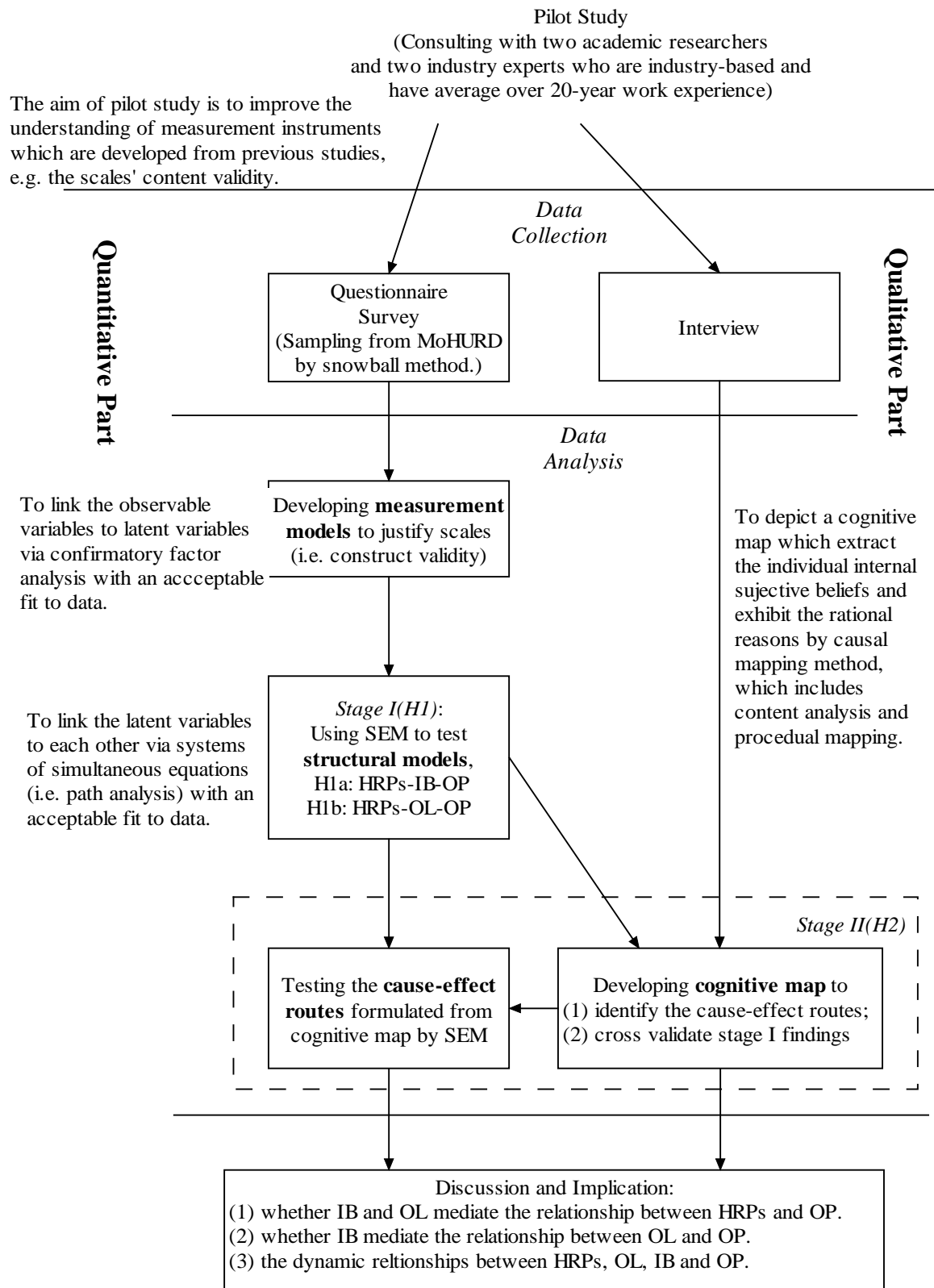


Figure 4- 4: Research Map

Legends: MoHURD, Ministry of Housing and Urban Rural Development; SEM, Structural Equation Modelling; HRP_s, Human Resource Practices; IB, Individual Behaviour (including In-Role behaviour and OCB); OL, Organisational Learning; OP, Organisational Performance.

Since the study seeks to investigate the mediating effects of individual behaviour and organisational learning on the relationship between HR practices and organisational performance (i.e. Hypothesis 1), and representative information of the variables in the context of Chinese construction enterprises is needed, a quantitative approach is adopted to test the relationships between variables from a large population using questionnaire sent to construction SOEs sampled from the Ministry of Housing and Urban Rural Development's registered firms.

According to 'Provisions on administration of qualification of construction enterprises (No.87)' issued by the Ministry of Housing and Urban-Rural Development of the People's Republic of China (<http://www.mohurd.gov.cn/>), there are three categories of contractors, i.e., 'general contractors' which may construct the whole range of projects itself, 'specialized contractors' which may sign subcontracts with the general contractors to undertake the specialized project(e.g. electronic subcontractor), and 'labour subcontractors' which can provide labour service to the main contractor. General contractors, according to their personnel, total assets, equipment capacity, finance capacity, experience, etc., are classified into four groups of premier grade, 1st grade, 2nd grade, 3rd grade or under. Because the majority of premier and first grade of general contractors are SOEs, the population will comprise these two grades. According to the National Bureau of Statistics of China (2006b), there are 174 general contractors in premier grade and 2445 in 1st grade in 2005. 20% of each group will be selected as the sample using the snowball method.

Structural equation modelling (SEM) which represents the hybrid of factor analysis and path analysis (Kaplan 2000) will be used to analyse the data by linking observed variables to latent variables via a confirmatory factor model and the latent variables to each other via systems of simultaneous equations (further refer to section 4.5). First, confirmatory factor analysis will develop a measurement model with an acceptable fit to the data (to achieve Objective 1). The second step in the analytical process is to form the structural model by specifying the causal relations in accordance with the hypotheses (to achieve Objective 2).

The quantitative approach may establish and provide the general relationships between main constructs (e.g. testing hypothesis 1). However, because of the nature

of complexity and dynamism of the context of organisational settings, and the unclear causal relationship between organisational learning, individual behaviour (including in-role and extra-role behaviour) and organisational performance, a qualitative approach is required to understand the complex situation in the Chinese construction SOEs. The telephone interviews are done concurrently when the questionnaire survey is produced. Then, the cognitive map is developed by causal mapping method (including content analysis and procedural mapping) to capture the rich information of the individual's internal subjective beliefs regarding HR practices and organisational learning, and the causal-effect loops (to achieve Objective 3). Another aim of qualitative approach is to explain and interpret the findings in quantitative stage. After the causal loops are identified, structural equation modelling method is applied again to confirm the interpretation of qualitative findings (i.e. the causal relationships).

4.3 Quantitative instrument development

Measurement instruments, or called scales, are important in quantitative studies (DeVellis, 2003), because the designed scales generally include the items which can reveal the different levels of theoretical constructs which cannot be observed directly. Especially, complex latent variables (e.g. HR practices, organisational learning, individual behaviour, and organisational performance) require multiple-item scales to capture the true meanings of the theoretical construct, and multiple-item scales have higher reliability and lower response bias than single-item scales. This section explains scale development of the main constructs respectively, and the process of Chinese version scale development.

HR Practices

Bamberger and Meshoulam (2000) categorise the configuration of high-performance HR practices from three dimensions as people flow (including staffing, training, mobility, and job security), appraisal and rewards, employment relation (job design, and participation), and this research adopts the configuration and collects data from these eight HR practices. HR practices scale in this research adapts mainly from Sun, Agyee and Law's (2007) work which investigates the hotels in China, supplemented

from Chen and Huang's (2009) and Lopez, et al. (2006). Sun, et al.'s (2007) HR practices scale is developed from Bae and Lawler (2000) (which is originally from Snell and Dean, 1992), and Delery and Doty (1996). Delery and Doty's (1996) measurement scale is also adopted by Akhtar, et al. (2008) in a sample of 465 Chinese companies.

After the draft scale is formulated, two Chinese academic researchers are consulted to substantiate the question items, and the researcher discussed with two Chinese industry experts to improve the application of the questionnaire in the context of Chinese construction SOEs. The items measuring *job security* and *job description* are adopted directly from Sun, et al. (2007). The revised items in the scale development are explained in the following.

- (1) *Staffing*. Items of “considerable importance is placed on the staffing process” and “very extensive efforts are made in selection” in Sun, et al.'s (2007) are deleted, because both items are considered as similar meaning as item 1 in Table 4-1 (i.e. great efforts is taken to select the right person.); then two items (see item 3, 4 in Table 4-1) of “staffing” from Lopez, et al. (2006) are added, which consider the candidates' expertise, skills and capability and team participation.
- (2) *Training*. Items of “Extensive training programs are provided for individuals in customer contact or front-line jobs” and “Formal training programs are offered to employees in order to increase their promotability in this organization” in Sun, et al.'s (2007) are integrated and adapted as item 5 in Table 4-1 (i.e. formal training programs are provided for employees.); item of “employees in customer contact job will normally go through training programs every few years” in Sun, et al.'s (2007) is deleted because of non-application to construction firms; two items (i.e. item 6 and 8 in Table 4-1) from Chen and Huang's (2009) are added from training comprehensive and problem-solving ability perspectives.
- (3) *Mobility*. Item of “employees do not have any future in this organization” in Sun, et al.'s (2007) is deleted because this question is too sensitive for Chinese employees according to the Chinese academic researchers' comments; item of “employees in customer contact jobs who desire promotion have more than one potential position they could be promoted to.” in Sun, et al.'s (2007) is

also deleted because there are limited positions in Chinese construction firms according to the Chinese industry experts' comments.

- (4) *Appraisal*. Item of "performance is more often measured with objective quantitative results" in Sun, et al.'s (2007) is deleted, because it is considered as similar meaning as item 14 in Table 4-1; item of "Performance appraisals are based on employee's behaviours." is added from Lopez, et al. (2006) to emphasize behaviour-based appraisal.
- (5) *Rewards*. Item of "close tie or matching of pay to individual/group performance" in Sun, et al.'s (2007) is deleted, because it is considered as similar meaning as item 15 in Table 4-1 (i.e. Performance appraisals are based on employee's behaviours.). Items of "the company offers incentives to its employees related to their performance." and "The organization has a mixed system of rewarding: fixed + variable." are added from Lopez, et al. (2006) to emphasize incentive payment and flexible reward system.
- (6) *Participation*. Item of "individuals in this job are allowed to make decisions" in Sun, et al.'s (2007) is deleted, because it is considered as similar dimension as item 23 in Table 4-1 (i.e. employees in this job are often asked by their supervisor to participate in decisions.). Item of "Inform the employees about economic and strategic information." is added from Lopez, et al. (2006) from perspective of information flow.

The final scale items and their specific consideration are listed in Table 4-1. The participant is asked to describe the extent to which their firms have adopted these practices on a five-point Likert scale, ranging from 1= 'strongly disagree' to 5= 'strongly agree'.

Table 4- 1: Components of Human Resource Practices measurement scale

	Item Description	Item Label
Selective Staffing		
1	Great efforts are taken to select the right person.	Selectivity in hiring
2	Long-term employee potential is emphasized.	Selection for future potential
3	In the selective process not only is knowledge and experience taken into account, but also the capacity to work in synergy and continuous learning.	Selection for expertise, skills and capability
4	The Members of the department or project team of which the new worker will be part, participate in the selection of candidates.	Selection of project team participation
Training		
5	Formal training programs are provided for employees.	Availability of formal training activities
6	There are comprehensive training policies and programs.	Training

7	There are formal training programs to teach new staffs the skills they need to perform their job.	comprehensive Training for new hires
8	There is training for problem-solving ability.	Problem-solving ability
Mobility		
9	Employees have few opportunities for upward mobility. (R)	Upward opportunity
10	Promotion in this organization is based on seniority. (R)	Seniority
11	Employees have clear career paths in this organization.	Career path
Job Security		
12	Employees in this job can be expected to stay with this organization for as long as they wish.	Job security
13	Job security is almost guaranteed to employees in this job.	Job security
Appraisal		
14	Performance appraisals are based on objective quantifiable results.	Results-based appraisal
15	Performance appraisals are based on employee's behaviours.	Behaviour-based appraisal
16	Employee appraisals emphasize long term and group-based achievement.	Development appraisal
Rewards		
17	The organization has a mixed system of rewarding: fixed + variable.	Flexible reward system
18	Individuals in this job receive bonuses based on the profit of the organization or the project.	Profit sharing
19	The company offers incentives to its employees related to their performance.	Incentive pay
Job Description		
20	The duties in his job are clearly defined.	Clearly defined
21	The job has an up-to-date description.	Up-to-date
22	The job description for a position accurately describes all of the duties performed by individual employees.	Accurately
Participation		
23	Employees in this job are often asked by their supervisor to participate in decisions.	Allow to make decisions
24	Inform the employees about economic and strategic information.	Information flow
25	Employees are provided the opportunity to suggest improvements in the way things are done.	Allow to suggest improvements
26	Supervisors keep open communications with employees in this job.	Communication

'R' represents 'Reverse-coded'.

Organisational Learning

Organisational learning relates to the changes in organisational knowledge that are induced by information processing (see information acquisition, distribution and integration) to enable the organisation to succeed. The conceptual confusion in organisational learning (e.g. the interchangeable terms between knowledge management and learning in the literature, Spender, 2008) may lead to measurement problems. In general management field, organisational learning has been identified from five dimensions in term of individual learning, process or system, culture or metaphor, knowledge management, and continuous improvement (Wang and Ahmed, 2003). At the same time, Nevis, Dibella and Gould (1995) describe organisations as

learning systems from two-part model: learning orientations, which are the values and practices that reflect the place and nature of what is learned; and facilitating factors which refer to the organisational structures and processes that affect the easy extent and amount for learning to occur.

In measurement level, there is no scale which is accepted to measure organisational learning because of the complexity of theoretical construct. For example, Nonaka, et al. (1994) conduct confirmatory factor analyses and support organisational knowledge creation as a higher-order construct comprising four knowledge conversion processes: socialization, externalization, combination, and internalization. Goh and Richards (1997) measure learning capability to benchmark organisations to help managers design interventions to overcome specific barriers and build a learning organisation, and the learning capability measurement include five dimensions: clarity of purpose and mission, leadership commitment and empowerment, experimentation and rewards, transfer of knowledge, and teamwork and group problem solving. At the same time, Hult and Ferrel (1997) develop organisational learning capability scale from four dimensions: team orientation, systems orientation, learning orientation, and memory orientation. Bontis, et al. (2002) measure the learning stocks in different levels (see individual, group and organisational) and flows (see feed-forward and feed-back) in an overall organisational learning system. Then, basing on previous theoretical and empirical researches, Lopez, et al. (2006) develop organisational learning scale from four dimensions: knowledge acquisition, knowledge distribution, interpretation, and organisational memory.

Regarding organisational learning measurement in construction, Kululanga, et al. (2002) measure construction contractors' organisational learning process from two elements of awareness (i.e. understanding the learning dimensions and factors for double-loop learning, like climate of openness, commitment of leadership to learning, shared vision building up of a company, etc.) and behaviour (i.e. the implemented strategies for organisational improvement, like continuous employee learning, internal knowledge sharing, lessons learnt from past experience, etc.). Wong and Cheung (2008) measure the contracting organisations' learning practice from intra- and inter-organisational learning. Tan, et al. (2006) interview 18 senior staffs from six construction companies to understand in-depth the capture and reuses of project

knowledge, and suggest combination of knowledge management technology(e.g. groupware, expert directory, project extranet) and techniques(e.g. communities of practice, training, forum, post-project reviews) in fulfilling the requirements for the project knowledge capture and reuse.

In this study, the measurement of organisational learning is mainly consulted from Kululanga, et al.'s (2002) learning behaviour part, supplemented from Lopez, et al.(2006), Tan, et al. (2006), and substantiated by the pilot study. Item of “developing capacity to respond to future business processes” in Kululanga et al.'s (2002) is deleted, because according to the two Chinese industry experts' comments, the limitation of participants' position in organisations may affect their understanding and acknowledgement of the related information in firms which may be confidential and only known by higher-level managers. Two items regarding organisational memory are added (i.e. the development of standard documents and experts directions) according to Lopez, et al. (2006) and Tan, et al. (2006). Finally, the scale includes 11 items which represent different perspective of organisational learning, refer to Table 4-2. The participant is asked the extent of his agreement or disagreement with the description of organization learning employed by his company using five-point likert scale, ranging from 1= ‘strongly disagree’ to 5= ‘strongly agree’.

Table 4- 2: Components of organizational learning measurement scale

	Item Description	Item Label
1	The organization supports staffs' continuous individual learning.	Individual learning
2	The organization addresses team improvement through team communication.	Team learning
3	The organization has meetings or develops online website to motivate staffs to sharing their knowledge and experience.	Internal knowledge sharing
4	The organization has meetings to learn the lessons from past experiences (successful or failed projects).	Lessons learnt
5	The organization integrates learning of the advantages from collaborative organizations (e.g. sub-contractors, joint venture).	Collaborative work schemes
6	The organization investigates new construction methods or building materials within the firm or by arrangement with others.	Internal improvement schemes
7	The organization addresses improvement through learning from consultant organizations, rivals or employers.	Learn from others
8	The organization changes its construction program to adapt the variety in the environment.	Continuous renewal of business processes
9	The organization seek new development in construction sector.	Seeking new developments
10	The organization has standard reusable documents (e.g. project management, work schedule)	Standard document
11	The organization has directions of experts according to their fields, so as to find an expert on a concrete issue at any time.	Experts directions

Organizational Performance

Organisational performance measurement has been discussed in literature review (see section 3.3.2), including the well-known measurement metrics(e.g. balanced scorecard, key performance indicators, and excellence model). Because the aim of this research is not to measure specific company's performance or develop a complicated measurement system, but to find the causes influencing the performance, mature measurement metrics are not used in this study. Then, organizational performance in this study is measured from subjective variables (i.e. perceived organizational performance) based on Katou and Budhwar (2008)'s study. The measurement items are consulted with two Chinese industry experts, who acknowledge that the items are usually accepted as evaluation facets of performance in Chinese construction firms. During survey, the participant is asked about the perception of their firm's performance over the past 3 years using a five-point Likert scale with 1 = 'very bad' and 5 = 'very good'. The items include: Revenue growth; Profit growth, Market share; Effectiveness (i.e. the organization meets its objective); Efficiency (i.e. the organization uses the fewest possible resources to meet its objectives); Development (i.e. the organization is developing its capacity to meet future opportunities and challenges); Satisfaction (of employees and clients); Innovation (for construction method, material, or project management method.); and Quality (i.e. construction project quality).

Individual Behaviour

Individual behaviour in organisations includes in-role behaviour and extra-role behaviour as discussed in literature review section 3.4. In-role behaviour is defined by Williams and Anderson (1991) as "the behaviour that is recognized by formal reward systems and is part of the requirements as described in job descriptions (p.606)". And the measurement scale of "in-role behaviour" developed by Williams and Anderson (1991), which is originally based on O'Reilly and Chatman (1986), has been accepted and adopted by researchers, e.g. Chambel and Castanheira (2006), Chiaburu and Baker (2006), Moideenkutty (2005), and Barksdale and Werner (2001). So, Williams and Anderson (1991)'s in-role behaviour scale is adopted in this study. The scale

contains 7 items with responses on a 1-5 scale ranging from Almost Never to Almost Always. The example item refers to “I adequately complete assigned duties”.

Individual's extra-role behaviour is manifested by OCB in this study. There are two conceptualizations of OCB: Organ's (1988) five dimensions of altruism, conscientiousness (or compliance), sportsmanship, courtesy and civic virtue; and Williams and Anderson (1991) two dimensions of OCBI and OCBO. Both conceptualizations are well known and accepted by researchers. Furthermore, Hoffman, et al. (2007) extend previous meta-analytic reviews of OCB literature by using confirmatory factor analyses, and find that OCB dimensions altruism and courtesy served as manifest indicators of an OCBI factor, and the OCB dimensions generalized conscientiousness, sportsmanship and civic virtue served as manifest indicators of OCBO, which is supported by Podsakoff, et al. (2009). Williams and Anderson (1991)'s scales on OCBI and OCBO have been used by Skarlicki and Latham (1995), Dipaola and Tschannen-Moran (2001), Somech and Drach-Zahavy (2004) and Erturk (2007) in their empirical studies. And because this study attempts to understand the contribution of OCB on the organisation and other individuals separately, Williams and Anderson (1991)'s OCBI and OCBO scale is adopted in this study. The scale contains 14 items with responses on a 1-5 scale ranging from Almost Never to Almost Always. The example items refer to “I help others who have heavy workloads” and “I give advance notice when unable to come to work”.

Control Variables

Based on previous research, there are two control variables which are likely to influence organisational performance and adoption of HR practices and organisational learning, namely firm age and firm grade. Similarly, employees' characteristics may also affect individual behaviour.

Firm Age

The organizations at different development stages may operate different HR practices (Kochan and Barocci, 1985; Lengnick Hall and Lengnick Hall, 1988; Sisson and Storey, 2000; Leung, 2003) and organizational learning (Chen and Huang, 2009). So, firm age (i.e. firm history) is designed as a control variable, like less than 5 years, 5-10 years.

Firm Grade

As described in section 4.2, general contractors, according to their personnel, total assets, equipment capacity, finance capacity, experience, etc., are classified into four groups of premier grade, 1st grade, 2nd grade, 3rd grade or under. And this study investigates premier and 1st grade contractors. The firms in different grade may adopt different HR practices and learning practices, and may have different organisational performance. So, firm grade (e.g. premier grade or 1st grade) is designed as a control variable.

Participant Characteristics

In the individual level, participant characteristics (e.g. age, work experience, job title and education level) might affect his/her perception of the HR practices, organizational learning and performance in the organization. And regarding individual behaviour, including in-role behaviour and OCB, employees may behave differently with different experience and background (Morrison and Phelps, 1999). So, participant characteristics (e.g. age, work experience, job title and education level) are designed as another group control variables.

Chinese version scales development

The quantitative measurement instruments are based on or adapted from previous studies as above discussion, which are originally constructed in English and translated into Chinese. According to Behling and Law (2002), the translated instruments need to satisfy two requirements: (1) reliability and validity of measurement scales; (2) the target language scales (i.e. in Chinese) are equivalent relative to the original language scales in terms of semantic, conceptual, and normative consideration. The 'translation/back-translation' technique (compared with direct translation) is used in translation to satisfy the two requirements, because of its relatively high on informativeness, source language transparency, security and practicality (Behling and Law, 2002; Ding and Ng, 2007). After the draft instruments are developed in the following part of this section, the 'translation/back-translation' technique is adopted following Behling and Law's (2002) suggestions:

- (1) The bilingual researcher is asked to translate the original draft scales from English into Chinese, and then two Chinese academic researchers are consulted to substantiate the question items and improve the understanding of the language as the draft Chinese version scales;
- (2) Another two bilingual researchers (i.e. peer researchers who has no knowledge of original English scales) are employed to translate the draft Chinese version back into English;
- (3) The original scales and back-translated English version are compared and discussed among the four skilled researchers participating in a meeting;
- (4) The draft Chinese version scales are modified according to the discussion of the difference emerged at step 3, and refined based on the comments from two Chinese industry experts to improve the application of the questionnaire in the context of Chinese construction SOEs.

The sample of questionnaire in English and Chinese version are attached in Appendix I and II respectively. Regarding the quantitative data analysis method, the preliminary data analysis (e.g. descriptive analysis, reliability test) and factor analysis are popular and well known, which are not explained in detail in this piece of work. Structural equation modelling method, which includes measurement modelling and structural modelling (i.e. path analysis), is introduced in section 4.5. Addition to the measurement scale development in quantitative study, the interview scale in qualitative study is also constructed (see next section).

4.4 Interview scale development

Basically, the qualitative research questions are different from quantitative ones. As Corbin and Strauss (2008, p.24) state: “the manner in which a researcher asks the research question(s) is important because it determines to a large extent the research methods that are used to study it.” Because qualitative studies are exploratory and more hypothesis-generating rather than testing, the investigator needs to frame interview questions in a manner of flexibility and freedom to explore the research objective in depth. Constructing interview questions should avoid affectively worded questions, double-barrelled questions, and overly complex questions (Berg, 2007).

The interview questions are formulated in this study according to the objective of qualitative study and the definitions of the constructs.

The objective of qualitative study is to find the complex cause-effect internal mechanism among HR practices, organisational learning, individual behaviour and their impact on organisational performance.

It is impractical and time-consuming to investigate all the dimensions of organisational learning and HR practices and it would be too complex in the final cognitive map when including all the dimensions. Because individual (e.g. individual thinking and acting that produces learning) is the key to organisational learning (Argyris, 1995), and knowledge sharing between individuals provides opportunity for transferring knowledge among employees and then contributing to knowledge at organisational level (Hendriks, 1999). As Ipe (2003) explains that knowledge sharing links to Huber's (1991) knowledge distribution and knowledge acquisition in organisational learning. So organisational learning in qualitative study is manifested by individual learning and knowledge sharing between individuals. Regarding HR practices, only training and rewards are investigated in this qualitative part, because training and rewards are currently the most popular and critical topics in HR management in China (Fang, 2000). Hence, the research questions in the qualitative study include:

- (a) What are the relationships between organisational learning (in terms of individual learning and knowledge sharing) and individual behaviour (including in-role behaviour, OCBI and OCBO)?
- (b) How do HR practices (in terms of training and rewards) affect organisational learning (in terms of individual learning and knowledge sharing) and individual behaviour (including in-role behaviour, OCBI and OCBO)?
- (c) How do organisational learning (in terms of individual learning and knowledge sharing) and individual behaviour (including in-role behaviour, OCBI and OCBO) affect organisational performance?

Based on the definitions of the constructs (i.e. training, rewards, employee's in-role behaviour, OCBI and OCBO, and knowledge sharing), the interview questions are formulated in follows.

Goldstein (1980) defines *training* as “the acquisition of skills, concepts, or attitudes that results in improved performance in an on-the-job environment (p.230)”. Evans and Davis (2005) describe training as “extensiveness of formalized programs to develop knowledge, skills and abilities (p.760)”. The examples of training program include: Training for current and future skills including technical and interpersonal; cross training; training for both new hires and experienced employees. Training is arranged by needs assessment from perspectives of organisation, task, person and demographic (Latham, 1988; Tannenbaum and Yukl, 1992). From outcome perspective, Goldstein and Ford (2002) describe “training” as a systematic approach to learning and development to improve individual, team and organizational effectiveness. According to the literature, the interview questions regarding training include:

- (1) How does your company design the training program?
- (2) Were the training activities applicable for you? What kinds of training method and content do you think are applicable for your construction company?
- (3) Is there any procedure to evaluate training events that ensure transfer and application of newly acquired knowledge, skills and abilities (KSAs)?
- (4) What is the effect of training for you (e.g. improving your KSAs)? Do you apply the newly acquired KSAs to your job? What constraints do you think affect the application of newly acquired KSAs?

Allen and Kilmann (2001) describe that “*reward* system should be aligned to motivate employee performance that is consistent with the firm’s strategy, attract and retain people with the knowledge, skills and abilities required to realize the firm’s strategic goals, and create a supportive culture and structure(p.114)”. There are two kinds of reward practices: intrinsic and extrinsic reward practices (Porter and Lawler, 1968; Allen and Kilmann, 2001). Then, the interview questions regarding rewards include:

- (5) What kind of reward practices (intrinsic or extrinsic) does your company provide? What are the effects of these reward practices on you (e.g. do these reward practices motivate you to work harder)?
- (6) What conditions can attract you to quit the job and join another company?

Employee's in-role behaviour is recognized by formal reward systems and its requirement is prescribed, and is defined as "the behaviour which is required or expected as part of performing the duties and responsibilities of the assigned role (Van Dyne, et al., 1995, p.222)". Organ (1988, p.4) defines OCB as "behaviour that is discretionary, not directly or explicitly recognized by the formal reward system, and in the aggregate promotes the efficient and effective functioning of the organization". OCB goes beyond the enforceable requirement of the job description, and is clarified contingently on the job changing (Organ, 1997). OCBO benefit the organization in general, and OCBI immediately benefit specific individuals and indirectly through this means contribute to the organization (Williams and Anderson, 1991). Then, the interview questions regarding individual behaviour are:

- (7) When you have difficulties in fulfilling the responsibilities specified in your job description, how will you solve them?
- (8) Do you intend to perform some behaviour which goes beyond specified role requirement, like cooperative and helping behaviours? Why? What can elicit you to perform such extra-role behaviours?
- (9) If you perform extra-role behaviour (like helping your colleagues, or providing suggestions for the project or the firm), in your opinion, what are the effects of such behaviours?
- (10) How does your individual performance contribute to organisational performance?

Knowledge sharing between individuals is defined by Ipe (2003) as "the process by which knowledge held by an individual is converted into a form that can be understood, absorbed, and used by other individuals (p.342)". Knowledge sharing activity involves two parties: the one who possesses the knowledge, and the other one who acquires the knowledge (Hendriks, 1999). Then, the interview questions regarding knowledge sharing between individuals are:

- (11) In your opinion, what are the effects of the knowledge sharing between you and your colleagues?
- (12) What are the factors that can influence the knowledge sharing between you and your colleagues?

The above discussion explained the interview questions formulation, the sample of which is attached in Appendix III.

4.5 Structural equation modelling

Structural equation modelling (SEM), which represents the hybrid of factor analysis and path analysis (Kaplan 2000), helps researchers gain additional insight into causal models which reflect complex relationships with observed or latent variables. SEM originated from Sewall Wright's work in 1916 (Bollen, 1989), and has become one of the preferred data analysis methods recently. As Shah and Goldstain (2006, p.149) state: "structural equation modelling is a technique to specify, estimate, and evaluate models of linear relationships among a set of observed variables in terms of a generally smaller number of unobserved variables". SEM is very broad (Kline, 2005), so in this section, only basic facets of SEM are introduced, including its mathematical specification, key assumptions underlying model specification, advantages over other statistical approaches, "conventional" approach in using SEM, model fit indices, and SEM statistical packages to accomplish the model estimation.

Mathematical specification of SEM

Simply speaking, a structural equation model represents a specific pattern of relations among the latent variables which are measured by observed variables. Correlation and regression (bivariate or multiple) are basic statistical concepts and prerequisite knowledge to understand SEM. Three equations below, which are fundamental, can represent SEM mathematically (Jöreskog and Sörbom, 1996; Maruyama, 1998; Shah and Goldstein, 2006). Equation (1) represents the directional influences of the exogenous (i.e. independent) latent variables (ξ) on their indicators (x). Equation (2) represents the directional influences of the endogenous (i.e. dependent) latent variables (η) on their indicators (y). Thus, Equation (1) and (2) link the observed variables to latent variables through a factor analytic model, which constitute the "measurement part" of the whole model (i.e. traditional factor analysis approach). Equation (3) represents the endogenous latent variables (η) as linear functions of other exogenous latent variables (ξ) and endogenous latent variables (η) plus residual terms

(ξ). Thus, Equation (3) specifies relationships between latent variables through a structural equation model and constitutes the “structural part” of the whole model.

$$x = \Lambda_x \xi + \delta \quad (1)$$

where x is the measures of exogenous manifest variables, Λ_x is the factor pattern matrix relating observed exogenous variables (observed measures) to latent exogenous variables, ξ is a vector of latent exogenous variables, δ is a vector of residuals for the observed variables.

$$y = \Lambda_y \eta + \varepsilon \quad (2)$$

where y is the measures of endogenous manifest variables, Λ_y is the factor pattern matrix relating observed endogenous variables (observed measures) to latent endogenous variables, η is a vector of latent endogenous variables, ε is a vector of residuals for the observed variables.

$$\eta = \Gamma \xi + B \eta + \zeta \quad (3)$$

where Γ is a weight matrix of partial regression coefficients relating exogenous to endogenous variables, B is a weight matrix of partial regression coefficients interrelating endogenous variables, and ζ is a vector of residuals for latent endogenous variables.

Covariance is the key to understand SEM, so other terms are also used in literature such as covariance structure analysis, covariance structural modelling (Kline, 2005). Kaplan (2000) argues that “SEM is a special case of a more general covariance structural model (p.56)”. The simple equation ($\text{Cov}_{xy} = r_{xy} \text{SD}_x \text{SD}_y$, Where r_{xy} is the Pearson correlation between X and Y , SD_x and SD_y are their standard deviations.), can represent the covariance between two variables, X and Y , which means the strength of the association between X and Y and their variabilities.

Except for the equation (1), (2) and (3), it is also necessary to define the covariance matrices for exogenous (i.e. independent) observed variables (ξ) and the measurement errors (Maruyama, 1998, p.201): $\Phi = E(\xi\xi')$, $\theta_\delta = E(\delta\delta')$, $\theta_\varepsilon = E(\varepsilon\varepsilon')$ and $\Psi = E(\zeta\zeta')$.

Then, the population covariance matrix (Σ) for the measured variables is estimated by the sample covariance matrix (S), which is a function of eight parameter matrices (Kaplan, 2000; Shah and Goldstein, 2006): Λ_x , Λ_y , B , Γ , Φ , θ_δ , θ_ϵ and Ψ , represented in Equation (4).

$$\Sigma = \begin{bmatrix} \Lambda_y(1-B)^{-1}(\Gamma\Phi\Gamma'+\Psi)(1-B)^{-1}\Lambda_y+\theta_\epsilon & \Lambda_y(1-B)^{-1}\Gamma\Phi\Lambda'_x \\ \Lambda_x\Phi(1-B)^{-1}\Lambda'_y & \Lambda_x\Phi\Lambda'_x+\theta_\delta \end{bmatrix} \quad (4)$$

The common statistical methods to estimate model parameters (e.g. B , Γ , Φ and Ψ) are maximum likelihood, generalized least square, weighted and unweighted least square and ordinary least square. All the estimation methods have advantages/disadvantages compared with others, and the method adoption depends on the distributional assumptions underlying these methods (Kaplan, 2000). For instance, central to the development of the maximum likelihood estimator is the assumption that “the observations are derived from a population that follows a multivariate normal distribution (Kaplan, 2000, p.25)”. In this study, Maximum likelihood is used to estimate the parameters, because: (a) maximum likelihood can attain optimal asymptotic properties when the data follow a continuous and multivariate normal distribution (Kaplan, 2000); (b) it is widely used (Shah and Goldstein, 2006); (c) it is highly available (Hoyle, 1995).

Key assumptions underlying model specification

Before structural equation modelling is applied, there are several conceptual assumptions be considered at pre-analysis stage and statistical assumptions at data analysis stage to ensure accurate inferences, which is discussed in the following:

- (1) The hypothesized structural relationships with theory support represent the actual relationships in the studied population (Shah and Goldstain, 2006). SEM is adopted to assess how closely the observed data correspond to the expected patterns. So SEM is not suitable for exploratory research because the measurement structure is poor defined. And SEM is not recommended when the underlying theory to explain the structural model is poor estimated.
- (2) The observed variables (also called indicators) to measure a latent variable are *reflective* (Shah and Goldstain, 2006), which means that the observed variables are caused by the same underlying latent variable. On the contrary, if the observed

- variables are formative indicators, they should be constrained or added an index.
- (3) Regarding the interaction of the data and the estimation method, the assumptions include proper sampling mechanism, multivariate normality, no systematic missing data (i.e. random missing data), no specification error (Kaplan, 2000).

The advantages of structural equation modelling

“SEM family” includes many standard statistical procedure, such as multiple regression, ANOVA and general linear model (actually, multiple regression and ANOVA are members of general linear model), and all these three statistical procedures are the special instances of SEM (Kline, 2005). Thus, there are similarities within these statistical procedures (see SEM, correlation, multiple regression and ANOVA), and Hoyle (1995) summarises the similarity in four fundamental ways: (1) all of the approaches are based on linear statistical models; (2) statistical tests associated with the approaches are valid only if certain assumptions about the observed data are met, which for SEM are observations independence and multivariate normality; (3) none of the approaches can offer statistical tests of causality without logic, strong theory, or methodological strategies; (4) for all approaches, adjustments to the initial statistical hypothesis may increase the likelihood of sample-specific results, and the adjustments necessitate cross-validation.

Except the similarities discussed above, SEM also has some advantages over the other approaches (Hoyle, 1995):

- (1) Unlike ANOVA (which evaluates main effect and interaction hypotheses by default) and multiple regression analysis (which has a single outcome), SEM offers no default model specification, and places relatively few limits on the specified relations.
- (2) The capacity to estimate and test relations between latent variables, which is the most compelling characteristic.
- (3) SEM incorporates measurement error in the estimated models, which may dramatically increase the model’s validity.

Furthermore, Grace (2006) compares the difference of attributes between SEM and other multivariate analysis methods (see discriminant analysis, regression trees,

principal components analysis, and multiple regression), and summarizes them in Table 4-3.

Table 4- 3: Attributes of multivariate methods
(Source: Grace, 2006, p.19)

	SEM	DA	RT	PCA	MR
Include measures of absolute model fit.	√				
User can specify majority of relationships.	√				
Capable of including latent variables.	√			√	
Able to address measurement error.	√				
Allows evaluation of alternative methods.	√				√
Examines networks of relationships.	√				
Can be used for model building.	√	√	√	√	√

Legends: SEM, Structural Equation Modelling; DA, Discriminant analysis; RT, Regression Trees; PCA, Principal components analysis; MR, Multiple Regression.

The “Conventional” practice of SEM

Previously, the basic concepts and principles of SEM are introduced, and the advantages are discussed comparing with other statistical approaches. The “conventional” practice needs to be understood by researchers to adopt SEM to solve research problems empirically. Kaplan (2000) characterises the “conventional approach” shown in Figure 4-5.

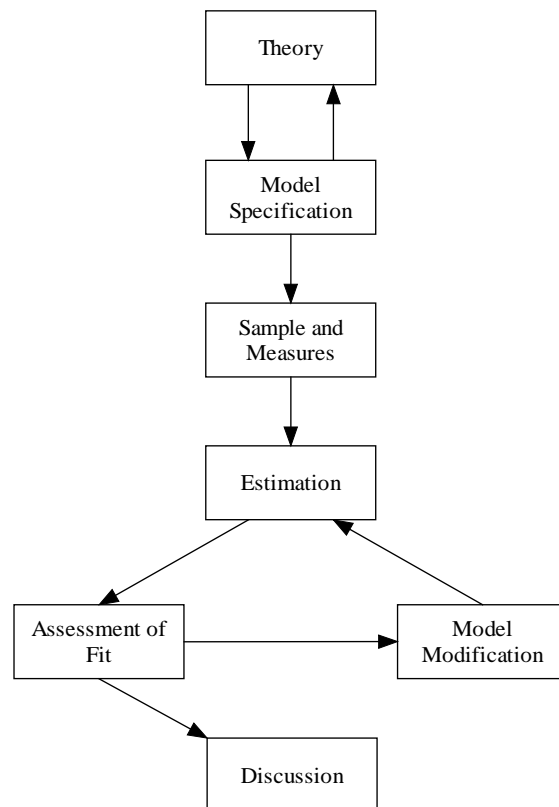


Figure 4- 5: Diagram of conventional approach to structural equation modelling
(Source: Kaplan, 2000, p.8)

Firstly, based on the logic and strong theory, or methodological strategies, the model specification is made (i.e. the structural equations represented in a path diagram), which is consistent with assumption one. *Secondly*, the sample is selected and the data are obtained from the participants by measurement scales, the development of which be based on assumption two. *Thirdly*, estimation is produced, including measurement model and structural model respectively, which is followed by an assessment of the goodness of fit of the model and by model modification if necessary. SEM includes measurement model and structural model. The measurement model is validated by confirmatory factor analysis, which requires that latent variables and their associated observed variables be specified by restricting observed variables to load on specific latent variables and by designating which latent variables are allowed to correlate (Shah and Goldstain, 2006). The structural model is tested by path analysis. Generally, estimation stage is cyclical with the model continually being modified and evaluated in terms of goodness of fit until the model meets some standard of adequate fit. *Finally*, based on the satisfactory model, the results are discussed, and the implication is interpreted. The empirical research samples adopting this

“conventional” approach of SEM can be found from Wei, et al. (2003), Wei, et al. (2004), Chang and Chen (2008) and Nakagami, et al. (2008). In this research, Hypothesis 1-a (see Figure 4-1), 1-b (see Figure 4-2), and 2 (see Figure 4-3) represent the specified models developed from the theories. The estimation stage of measurement model and structural model refers to Chapter 5. Several indices of goodness of fit are required to measure the degree of fit of the specified models.

Model fit indices

Unlike the traditional statistical methods, which relies on non-significance, modelling process in SEM require the assessment of models’ fit. One of the primary goals in model-testing procedure (in SEM) is to assess the goodness-of-fit between the hypothesized model and the sample data, which can be present in the following equation (Byrne, 2001).

$$\text{Data} = \text{Model} + \text{Residual}$$

Where Data represent score measurements related to the observed variables as derived from persons comprising the sample; Model represents the hypothesized structure linking the observed variables to the latent variables, and in some models, linking particular latent variables to one another; Residual represents the discrepancy between the hypothesized model and the observed data.

There are dozens of model fit indices in the SEM literature. Because there is no definitive fit index which can be applied to all cases with consistent criteria (i.e. cut-offs), nowadays researchers usually report multiple indices to measure the degree of fit of the data to the specified model (Hu and Bentler, 1998; Kline, 2005; Shah and Goldstain, 2006). Historically, the most popular criterion for model evaluation or selection is chi-square (χ^2) statistic, which relates to its degrees of freedom and represents the likelihood ratio test statistic. χ^2 statistic tests the extent to which the null hypothesis (H_0 , which postulates that specification of the factor loadings, factor variances/covariances, and error variances for the model under study are valid) is true (Byrne, 2001). The higher the probability associated with χ^2 , the closer is the fit between the hypothesized model (under H_0) and the perfect fit (Bollen, 1989). However, the accuracy of fit (i.e. bias) using χ^2 -statistic depends on the sample size (e.g. large), and the distribution assumptions underlying the test (e.g. multivariate

normality of variables) (Jöreskog and Sörbom, 1996). And χ^2 -statistic offers a dichotomous decision strategy (accept/reject) for assessing the adequacy of fit implied by a statistical decision rule (Bollen, 1989; Hu and Bentler, 1998). Thus, alternative fit indices are developed and used to quantify the degree of fit along a continuum (Hu and Bentler, 1998).

The fit indices are classified to two dimensions (Bollen, 1989; Hu and Bentler, 1998): absolute-fit index, which directly assesses how well a priori model reproduces the sample data; incremental-fit index, which measure the proportional improvement in fit by comparing a target model with (1) the saturated model with least restrict that exactly reproduces the observed covariance matrix, and (2) the more restricted, nested baseline model (i.e. the independence model) that is one of complete independence of all variables in the model (i.e. in which all correlations among variables are zero). Absolute-fit indices include root mean square error of approximation (RMSEA), root mean square residual (RMR), goodness-of-fit index (GFI), and adjusted goodness of fit (AGFI). Incremental-fit indices include normed fit index (NFI), non-normed fit index (NNFI or TLI), comparative fit index (CFI), and incremental fit index (IFI or BL89). A rule of thumb for the incremental-fit indices (i.e. NFI, TLI, CFI and IFI) is that values greater than 0.90 may indicate reasonably good fit of the hypothesized model (Bentler, 1992); however, Hu and Bentler (1999) advise the revised cut-off value close to 0.95.

RMR measures the mean absolute value of the covariance residuals, and represents difference between the data and hypothesized model matrix; however, RMR is computed with unstandardised variable, whose range depends upon the scales of the observed variable, and is required to transfer to Standardised RMR (SRMR, Kline, 2005). Then, SRMR value represents the average value across all standardised residuals, and ranges from zero to 1.0. Kline (2005) argues that SRMR values less than 0.10 are generally considered favourable; Hu and Bentler (1995) suggest that the SRMR value of a well-fitting model be small (say, 0.05 or less); Hu and Bentler (1999, p.27) report “a cut-off value of SRMR close to 0.08 seem to result in lower Type II error rates (with acceptable costs of Type-I error rates)”.

RMSEA, which reflect the residual difference between the observed data and hypothesized model matrix, has been recognized as one of the most informative criteria in covariance structural modeling (Byrne, 2001). Browne and Cudeck (1993) report that RMSEA values less than 0.05 indicate good fit, and values as high as 0.08 represent reasonable errors of approximation in the population. Similarly, MacCallum, et al. (1996) report that RMSEA values ranging from 0.08 to 0.10 indicate mediocre fit, and those greater than 0.10 indicate poor fit. Hu and Bentler (1999) suggest a value of 0.06 as the cut-off to indicate the good fit. Similar to SRMR, RMSEA value decreases when goodness-of-fit increases and is bounded below by zero (Browne and Cudeck, 1993).

Furthermore, Hu and Bentler (1998) argue that “a good fit index should have a large model misspecification effect accompanied with trivial effects of sample size, distribution, and estimation method (p.446)”. And according to their technical report, they find that: (a) maximum likelihood – based NFI is sensitive to sample size and moderately sensitive to complex model misspecification; (b) maximum likelihood – based GFI and AGFI are not sensitive to distribution but are sensitive to sample size; (c) TLI, IFI and CFI are less sensitive to distribution and sample size, moderately sensitive to simple model misspecification but are very sensitive to complex model misspecification, however, maximum likelihood – based TLI, IFI and CFI are more preferable when sample size is small; (d) maximum likelihood – based RMSEA is moderately sensitive to simple model misspecification, and very sensitive to complex model misspecification, but less sensitive to distribution and sample size; (e) RMR is the most sensitive to simple model misspecification and is moderately sensitive to complex model misspecification, and maximum likelihood – based RMR is preferable when sample size is small (e.g. $N \leq 250$). Then, NFI, GFI, AGFI are not recommended to use as fit indices when maximum likelihood is adopted to estimate the parameters (Hu and Bentler, 1998; Fan, et al., 1999). Finally, this research reports multiple measures of fit, including SRMR, RMSEA, TLI, CFI and IFI, which provide opportunity to evaluate the underlying fit of the observed data to the hypothesized model from multiple facets (Kline, 2005), and cut-off values of which are showed in Table 4-4.

Although the χ^2 -statistic has problems regarding sample size, the ratio of χ^2 to degrees of freedom ($\chi^2/\text{d.f.}$) is informative because it corrects for model size (Shah and Goldstain, 2006). So, the research also reports χ^2 , degree of freedom, and $\chi^2/\text{d.f.}$ to provide enough model specification information, which refers to Table 4-4.

Table 4- 4: Goodness-of-fit measures

Goodness-of-fit measure index	Levels of acceptable fit
χ^2 -statistic with degrees of freedom, $\chi^2/\text{d.f.}$	(Reported to provide specification information)
SRMR (root mean square error of approximation)	≤ 0.10
RMSEA (standard root mean square residual)	≤ 0.10
CFI (comparative fit index)	≥ 0.9
IFI (incremental fit index)	≥ 0.9
TLI (non-normed fit index)	≥ 0.9

SEM statistical packages

The three most popular commercial statistical packages regarding SEM include LISREL (Linear Structural Relationships, Jöreskog and Sörbom, 1996), Amos (Analysis of Moment Structures, Byrne, 2001), and EQS (Equations, Bentler, 1995). Both LISREL and EQS need write programs to do calculation and estimation. Whereas Amos is a more recent package which has user-friendly graphical interface, and has joined in SPSS Company recently which means data can transform from SPSS to Amos easily. And because Amos has been accepted as an easier software in the application structural equation modelling to research fields, such as psychology, medical and healthcare, social science, education, and institutional research, and the availability of Amos software promotes its adoption. Hence, Amos is applied as the software to do structural modelling analysis.

4.6 Cognitive map

“Cognitive map” is originally developed by Tolman (1948) to describe an individual’s internal mental representation of the complex situation within his/her environment. Cognitive map is also accepted as an artefact, a frame or outcome of cognitive mapping techniques which are used to identify and portray individual subjective

beliefs (Eden, 1992; Fiol and Huff, 1992). Similarly, Swan(1997) defines cognitive maps as “internally represented schemas or mental models for particular problem-solving domains that are learned and encoded as a result of an individual’s interaction with her environment (p.158)”. Then, cognitive mapping process refers to the extraction of individual internal subjective beliefs and exhibition of the causal reasons behind purposeful actions (Fiol and Huff, 1992), relating to the meaningful concepts of problem domains. Practically, cognitive mapping process includes content analysis which identifies what variables are present, and procedural mapping which extracts the relationships between such variables (Carley, 1997). Fiol and Huff (1992) identify three components of cognitive mapping process as key actors identification, categorisation of interrelationships between actors, and argument about the potential interconnections and the key cause-effects (i.e. routes). Ahmad and Ali (2003) describe three stages of mapping procedure as concept identification, link description, and property clarification. Furthermore, Siau and Tan (2005) argue that the cognitive map can supplement the implementation of the system methodology (i.e. soft system methodology, Checkland, 1981) in conceptual modelling process. Hence, the cognitive map is developed through the process by application of techniques in the context of conceptual modelling, and the three most popular techniques include causal mapping, semantic mapping, and concept mapping (Siau and Tan, 2005).

Causal mapping refers to an individual’s perception and interpretation of the events or problems in his/her own personal construct, and represents a set of cause-effect relationships (Kelly, 1955; Eden, 1988). Semantic mapping (or idea mapping) identifies the concepts and ideas which are related to the central concepts concerning creation, innovation or change, e.g. mind map (Buzan, 2009). Concept mapping connects the concepts by one-way, two-way or no-directional approach, and emphasises learning new knowledge from the past experience and previous knowledge, which is adopted in generating complex ideas and designing a complex model (Novak, 1993; Jonassen, et al., 1993). The choice of cognitive mapping techniques depends on problems solved and individual subject beliefs described (Swan, 1997). In this research, causal mapping is adopted because the aim of the qualitative analysis is to identify the meaningful concepts related to the main constructs(i.e. organisational learning, in-role behaviour, OCB, etc.), and to reveal the

cause-effect relationships between organisational learning and individual behaviour to understand the whole problem domains.

Causal mapping, as a technique of developing a cognitive map, has been discussed in terms of its application and procedure by Ahmand and Ali (2003) and Carley(1997), and has been applied in empirical research such as understanding software operations support expertise (Nelson, et al. 2000), multi-organisational scenario building (Goodier, et al., 2010), structuring a delay and disruption claim (Williams, et al., 2003), and information technology (Narayanan and Armstrong, 2005). Nelson, et al. (2000) identify five steps to construct a causal map:

- (1) Deriving *the causal statements* which imply explicit cause-effect relationships from the transcribed interview;
- (2) Breaking the causes and effects from the statements in step1 to construct *the raw causal maps*;
- (3) Identifying the *concepts* from raw causal maps by grouping the frequently mentioned words;
- (4) Recasting the concepts to the *concept level causal maps*;
- (5) Comparing the concept level causal maps across individuals, and then aggregating these maps into *construct level causal maps*.

After the construction of a causal map, evaluation is required to analyse its validity and implications. Causal map, because of its visual representations of all key constructs and direct causal links between these constructs, has been used to understand the complex systems in social sciences and businesses.

Although the strengths (e.g. symbolic representation, graphical layout, visual framework, capturing meaning concepts, representing individual internal subjective beliefs) of cognitive map motivate researchers to analyse the complex ideas, or cause-effect relationships of individual perception of events and problems, there are still weaknesses to consider when revealing a cognitive map (Ahmad and Ali, 2003), such as undue influence on the mapping process, difficulty in applying mapping skills, complexity in administering the large maps, time required, the difference between the mapping content and the understanding being mapped, and uncomfortable feelings from respondents.

4.7 Summary

In sum, two hypotheses are postulated at the beginning of this chapter. Namely, H1: HR practices enhance organisational performance through their influences on employees' behaviours and organisational learning; H2: Employees' behaviours mediate the relationship between organisational learning and performance and such behaviours are influenced by human resource practices. Then, mixed method (qual-quant) is designed to investigate the effects of individual behaviours and organisational learning on performance, and the role of HR practices to affect these effects. During the research process, pilot study firstly justifies the application of survey scales; data is collected by questionnaire survey and telephone interview; and then the mixed methods of structural equation modelling and cognitive mapping are adopted in data analyses stage. The research map is depicted in Figure 4-4. Data analysis methods of structural equation modelling and causal mapping are also introduced, following the development of quantitative and qualitative scales. In the next two chapters, the data analyses stage one (developing measurement model to achieve Objective 1, and testing structural models to achieve Objective 2) and stage two (identifying cognitive map and testing the cause-effect routes to achieve Objective 3) are produced respectively.

Chapter 5 Data Analysis – Stage One

In order to achieve Objective 1 and Objective 2, the purposes of stage one data analysis include: (1) to justify the implementation of measurement scales in this research using confirmatory factor analysis; (2) to test the hypothesis H1-a and H1-b using structural equation model. After the quantitative data analysis, the results and findings are discussed.

5.1 Sampling and Demographic Description

Section 4.3 has discussed the development of construct measurement instruments, which are adapted from previous studies and then translated into Chinese version by ‘translation/back-translation’ technique, and finally improved and refined through pilot study. The constructs are measured by the employee’s perception (e.g. perception of HR practices in the organisation). It is impractical to analyse all the employees from Chinese construction SOEs with premier or first grade certificate, so the proper sampling is important to ensure the quality of results. Because of the low correspond rate using random sampling within the context of China’s firm and hidden population (i.e. difficult for the researcher to access, e.g. there is no statistical figure which lists employee numbers of each construction company), this study adopts snowball sampling method (i.e. chain-referral sampling method). Snowball sampling is firstly introduced by Coleman (1958) and also called respondent-driven sampling, link-tracing sampling or random-walk sampling, which is easier, cheaper and quicker to collect data in a hidden population. Unlike traditional simple random sampling in which all people can be selected with the same probability, people with many friends are more likely to be selected, and the choice of “seeds” may produce unknown bias, so researchers have questioned the unbiased estimation from this sampling method (Berg, 1988). However, Salganik and Heckathorn (2004) explain the possibility to make unbiased estimations from hidden populations using respondent-driven sampling, and they argue that “these estimates are asymptotically unbiased no matter how the seeds are selected (p.197)”.

The sampling process in this study follows Salganik and Heckathorn's (2004) description: firstly, 117 people (as potential seeds) who work in Chinese construction SOEs with premier or first grade certificate were selected and contacted, whom of these 117 people are from various firms (regarding firm history, grade, location) with various personal characteristics (like age, work experience, job position and educational level); then, 42 of 117 participants returned their answered questionnaires, and these 42 respondents were viewed as "seeds" to recruit new sample members; lastly, data collection was closed when the desired sample size had been reached. The questionnaire were distributed and collected by e-mail, and the survey lasted four months from 1st May 2009 to 31st Aug. 2009. A total of 335 questionnaires were collected; 9 of them were eliminated which were obviously unconcerned (e.g. the same rating for all items); finally, 326 respondents were retained for analysis. Regarding the background information, the demographic description of the respondents is listed in Table 5-1.

Table 5- 1: Demographic characteristics

Firm History (years)	
≤ 10	55 (16.9%)
11-20	54 (16.6%)
21-30	57 (17.5%)
31-40	31 (9.5%)
> 40	121 (37.1%)
Firm Grade Certificate	
Premier grade	176 (54%)
First grade	130 (40%)
Individual Age (years)	
20-29	190 (58.3%)
30-39	90 (27.6%)
40-49	30 (9.2%)
50-59	11 (3.4%)
Work Experience (years)	
< 5	172 (53.9%)
5-10	58 (18.2%)
11-15	42 (12.9%)
16-20	22 (6.7%)
>20	25 (7.7%)
Job Title	
Project manager	43 (13.2%)
Technical staff	144 (44.2%)
Commercial Staff	115 (35.3%)
Financial staff	11 (3.4%)
Educational Level	
Polytechnic/Technical Institute's Degree	34 (10.4%)
Bachelor's degree	214 (65.6%)
Master's Degree	69 (21.2%)
PhD's Degree	5 (1.5%)

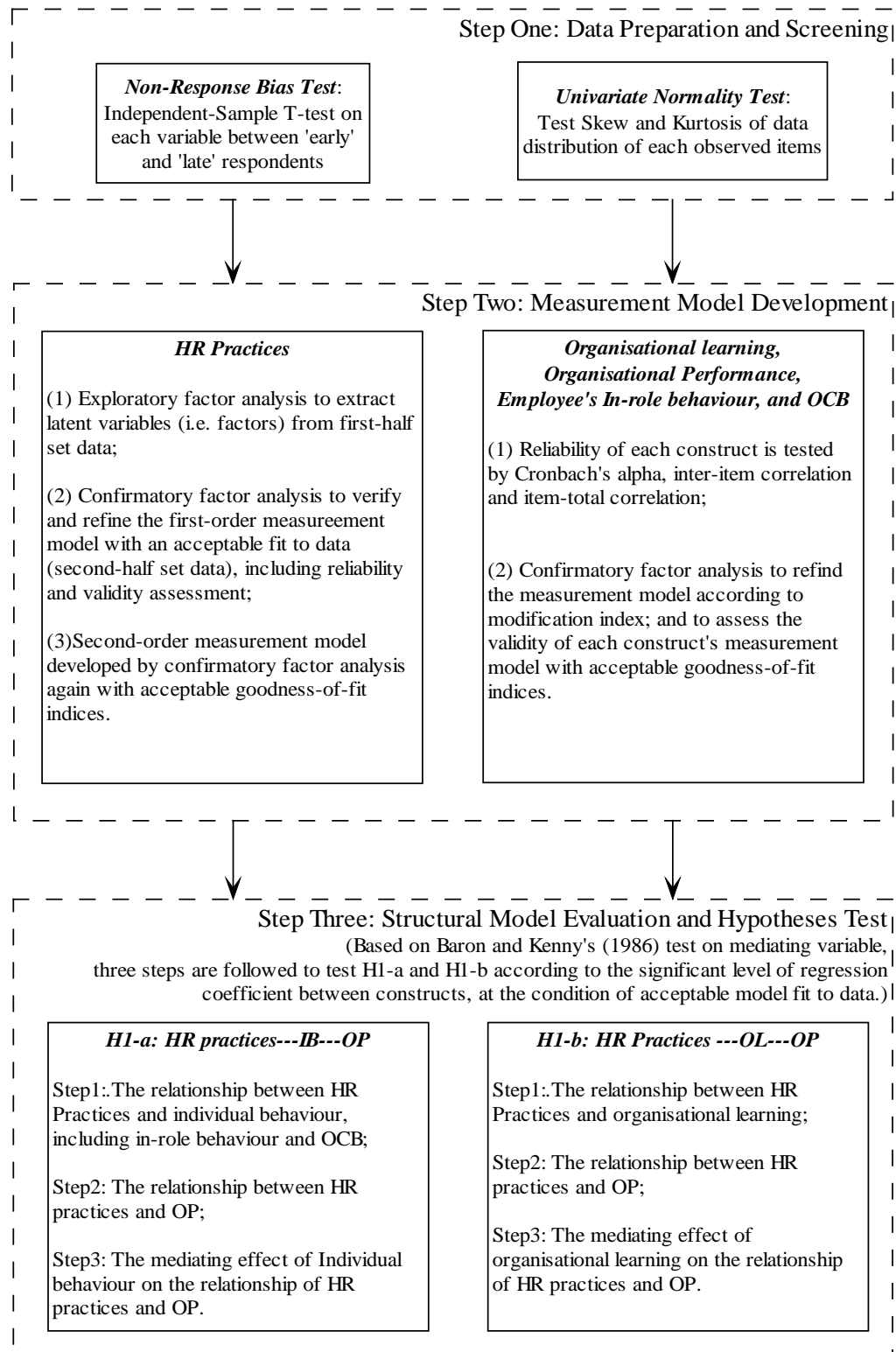
Among the respondents' firms, there are only 55 (16.9%) firms which have less than (or equal to) 10 years' history, which means more than 80% of respondents who are from firms that have established stable HR practices, and organisational learning mechanism during the firm development (with more than 10 years history). And there are slightly more respondents from premier grade (54%) than from first grade firms (40%). The correlation between firm history and grade is positive (correlation coefficient = 0.419, $p < 0.01$), which means the longer history the firm has experienced, the higher grade the firm receives. Regarding personal background information, there are 190 (58.3%) participants are 20-29 years old, and 172 (53.9%) participants have less than 5 years work experience, which represent the high correlation between age and work experience (correlation coefficient = 0.877, $p < 0.01$). There are 144 (44.2%) technical staffs and 115 (35.3%) commercial staffs involve in this survey, and these two groups' employees can understand organisational learning (i.e. knowledge sharing between individuals, lessons learnt from past experience) well and then provide more meaningful answer in questionnaire. Interesting, close to 90% of respondents have bachelor's degree or above (about 22.7% participants have master's degree), which means currently majority staffs of China's construction firms have got enough education compared with twenty years ago, and have capability to continuously learn by themselves when they face problems on the job.

5.2 Quantitative data analysis procedure

After the brief description of background information of participants, and based on measurement model developed in section 4.3 and the specified structural model in section 4.1, data analysis has to be done step by step according to Kline (2005), depicted in Figure 5-1.

- First, the raw data are prepared and screened before any further analysis, including non-response bias test and multivariate normality test;
- Second, exploratory factor analysis is adopted to identify and retain the latent variables (i.e. developing first-order and second-order factor model of HR practices), the reliability and validity of each measurement scales are tested (i.e. measurement model test, including evaluation of goodness-of-fit of

measurement model, and revising the measurement model related to the observed variables as derived from the sample data);



Legend: HR, human resource; IB, individual behaviour; OL, organisational learning; OP, organisational performance; OCB, organisational citizenship behaviour.

Figure 5- 1: Quantitative data analyses procedure

- Third, the structural model are tested based on the hypothesized model in Section 4.1 (i.e. model estimation), including goodness-of-fit evaluation and model modification until meet some standard of adequate fit.

5.3 Data preparation and screening

After data collection and eliminating the unconcerned data set, the raw data are inputted into Excel, and then transferred to SPSS (statistical package for social science) software. The score of reverse-coded items (see HR09, HR10, Individual Behaviour (IB) 06, IB07, IB17, IB18 and IB19) are recoded (e.g. old value '5' was changed to new value '1'). Then, raw data are ready to be screened, i.e. non-response bias test and multivariate normality test in this study.

5.3.1 Non-response bias test

In a statistical survey, non-response bias occurs if those who respond to the survey differ in the outcome variable from those who do not respond. In order to improve the validity of the empirical findings, it is necessary to test non-response bias. According to Armstrong and Overton (1977), the early respondents and late respondents (separating by the date of July 1st, 2010) are assumed as the proxy "respondent" (i.e. 147 valid questionnaires) and "non-respondents" (i.e. 179 valid questionnaires) respectively, to determine whether any potential non-response bias exists.

Independent-samples T-test is employed to compare the difference of mean score of the variables between two groups (Tseng and Lee, 2009). The variables in this test include: selective staffing, training, mobility, job security, appraisal, rewards, job description, participation, organisational learning, organisational performance, in-role behaviour, and OCB. The score of each latent variable is calculated by averaging its observed items' score.

The result of independent-samples T-test is present in Appendix IV-1. Mean score of all the variables between two groups (i.e. early and late response) shows no difference within 95% confidence interval, except for 'organisational learning' (F value = 4.678,

$p=0.031 < 0.05$). Overall, based on the analytical results, there is no significant difference (at $p<0.05$ level) between response samples and non-response ones. Hence, the non-response bias is unlikely to seriously limit the validity of this research.

5.3.2 Univariate Normality test

The application of structural equation modelling, especially the adoption of maximum likelihood to estimate the parameters, requires statistical assumptions, like multivariate normality (Kaplan, 2000). Although in the real world the assumption of multivariate normality can be unlikely met (West, et al., 1995; Lei and Lomax, 2005), the assumption is assessed in this study to improve the accuracy of parameter estimate. Multivariate normality includes (Kline, 2005): (1) all the univariate distributions are normal, (2) the joint distribution of any pair of the variables is bivariate normal, and (3) all bivariate scatterplots are linear and homoscedastic. It is impractical and difficult to assess all the aspects of multivariate normality; and because the inspection of univariate distributions of each observed items and deleting the items which are outliers, may contribute to multivariate normality (Kline, 2005). This study assesses the univariate distributions of each item. The distribution of non-normal is manifested by two indicators: skew and kurtosis (Curran, et al. 1996), which can be calculated by SPSS program.

The ratio of the value of an unstandardised skew/ kurtosis index for each observed variable over its standard error is used by researchers (Curran, et al., 1996; DeCarlo, 1997) to indicate the nonnormality conditions. The result of the ratio for each observed variable is presented in Appendix IV-2. Generally, there is no clear consensus regarding an acceptable degree of non-normality (Finney and DiStefano, 2006). The variables with absolute values of skew index greater than 3.0 are described as extremely skewed (Kline, 2005); Curran, et al. (1996) argue that the absolute value approaching 2.0 is suspect; Lei and Lomax (2005) state the value are generally selected between -2.0 and +3.5 to indicate skew. Regarding kurtosis, DeCarlo (1997) suggests absolute value below 3.0 is described as normal distribution; Curran, et al. (1996) argue the absolute value above 7.0 is suspect; and Kline (2005) suggests the

absolute value of kurtosis index greater than 10 indicates a problem of nonnormal distribution. The results of this study are discussed as follows.

HR Practices. Concerning skew index of the 26 observed variables of HR practice (refer to Appendix IV-2), 16 variables have absolute value below 2.0; 8 variables' absolute value of skew index is between 2.0 to 3.0; and two variables (HR17 and HR 23) have values of -3.52 and 4.04 respectively. Regarding kurtosis, 21 variables have absolute value below 3.0; 5 variables have value of kurtosis index between -3.13 and -3.66. From the results of skew and kurtosis index, except for two variables of HR17 and HR23 which have skew distribution problem, the data of the other variables to measure HR practices can be viewed as normal distribution.

Organisational Learning (OL). 8 variables of total 11 observed variables (refer to Appendix IV-2) have absolute value of skew index below 2.0; the other three (i.e. OL1, OL9, OL10) have the value of -3.49, -3.08 and -3.10 respectively. Regarding kurtosis index, the absolute values of 8 variables are below 3.0, and the other three have the value from -3.17 to -3.55. So, the data distribution of OL1 has skew problem, and the data of the other ten observed variables of organisational learning can be viewed as normal distribution.

Organisational Performance (OP). 6 variables of total 10 observed variables (refer to Appendix IV-2) have absolute value of skew index below 3.0; the other four variables (i.e. OP1, OP4, OP7, OP10) have the value of -3.33, -3.08, -3.32, -4.24 respectively. Regarding kurtosis index, the absolute values of all variables are below 2.0, except for the value of OL10 (3.60). So, data distribution of all the observed variables of organisational performance can be viewed as normal distribution, except for OP10, which has skew problem.

In-Role behaviour. The absolute value of skew index of all the 7 observed variables (refer to Appendix IV-2) of in-role individual behaviour (IB) is above 3.0 but below or close to 5.0, with two outliers of IB3 (-7.71) and IB7 (-13.74). Similarly, the absolute value of kurtosis index of all the 7 observed variables is below 2.0, except for IB3(2.74) and IB7(13.20). So, the data distribution of all the observed variables of

in-role behaviour have skew problem, especially for IB3 and IB7 whose data distribution are extremely skew; and the data distribution of IB7 has kurtosis problem.

OCBI. The absolute value of skew index of all the 7 observed variables (refer to Appendix IV-2) are below 2.0, except for IB10 (-3.53) and IB12 (-2.37). Regarding kurtosis index, the absolute values of all 7 variables cover 0.75 to 2.01. So, the data of all the 7 variables of OCBI can be viewed as normal distribution, except for IB10 which has skew problem.

OCBO. Of the 7 observed variables (refer to Appendix IV-2), only the data of IB15 (skew index = -1.86; kurtosis index = -2.01) is normal distribution; data distribution of IB16(skew index= -10.35), IB17(skew index= -11.22) and IB18 (skew index= -16.88) have extremely skew problem, and IB18 (kurtosis index = 22.34) has extremely kurtosis problem; for IB19, IB20 and IB21, the absolute values of kurtosis index are below 2, and the values of skew index are -6.99, -6.69 and -5.61 respectively, which mean the data distribution of these three variables have skew problem.

Overall, for all 68 observed variables in this study (refer to Appendix IV-2), 13 variables' (HR17, HR23, OL1, OP10, IB3, IB7, IB10, IB16, IB17, IB18, IB19, IB20, IB21) data are non-normal distributed, of which 5 variables (i.e. IB3, IB7, IB16, IB17 and IB18) have extreme nonnormality problem. One reason of nonnormality is that this study measure the variables by ordered categories (e.g. agree, disagree) rather than truly continuous scale (West, et al., 1995).

Regarding violation of normality, Finch (1993) finds that moderate nonnormality has negligible effects on parameter estimates using maximum likelihood. Similarly, Lei and Lomax (2005) examine the robustness of structural equation model using data with different degrees of nonnormality, and they find that nonnormality condition have no significant differences in the standard errors of parameter estimates, but has a significant effect on bias of parameter estimates; however, they suggest that the nonnormality might not be extremely concerned with the effect by researchers, because that “the worst effect of the bias is generally considerably less than 10% (p.16)”.

Hence, only the five observed variables of individual behaviour (IB) which have extreme nonnormality problem are discarded, i.e. IB3, IB7, IB16, IB17 and IB18; and the other 8 variables whose data distribution have moderate nonnormality problem are retained for the analysis of measurement model.

5.4 Measurement model development

Conceptual validity of measurement items has been demonstrated in pilot study in consultation with two Chinese academic researchers and industry experts, who have average 20 years industry-based experience. Factorial validity and reliability of the scales, validity and reliability of measurement models are examined in this section by factor analysis to develop the measurement instruments. Generally, factor analysis includes two approaches (Floyd and Widaman, 1995): (1) exploratory approaches, which aim to identify the underlying dimensions of a construct (i.e. discover the latent variables that underlie the scale) by exploratory factor analysis method (i.e. common factor analysis), or for data reduction (i.e. combining a set of measured variables into summary indices) by principal components analysis; (2) confirmatory approaches, which is used to confirm a priori hypothesis based on theory and previous empirical studies. Furthermore, exploratory factor analysis is suitable in initial measurement development stage to retain factors which account for significant amounts of variance in the data, by eliminating from the measurement scale any item with substantial loadings on more than one factor; confirmatory factor analysis is useful in the later stage to assess goodness-of-fit based on the variance remaining after the factors are taken into account (Floyd and Widaman, 1995; Deery, et al., 1999).

In this section, firstly, factorial validity and reliability of each measurement scale (i.e. HR practices, organisational learning, organisational performance, individual behaviour, including in-role behaviour and OCB) are assessed by Cronbach's Alpha, inter-item correlation and item-total correlation, and especially HR practices are assessed by exploratory factor analysis; then, measurement model of each construct is confirmed by confirmatory factor analysis (including unidimensionality, convergent

validity and discriminant validity), which is employed to evaluate the pre-specified factor model with an acceptable fit to data.

5.4.1 HR Practices

Because the measurement scale of HR practices in this study is initially developed in the context of western countries, factorial validity assessment are required in the context of Chinese construction SOEs. Exploratory factor analysis are adopted to extract factors (i.e. latent variables) which cause the observed variables to covary. In order to improve the quality of factor analysis (Kline, 2005, p.205), the data set was split into two parts, one for exploratory factor analysis and the other one for confirmatory factor analysis later (Ding and Ng, 2008).

Exploratory factor analysis of HR practices measurement scale

The following steps are followed during the process of exploratory factor analysis by SPSS 16.0 (Floyd and Widaman, 1995; Costello and Osborne, 2005):

- (1) Bivariate correlation between each observed variables of HR practices are tested, and results (refer to Appendix IV-3) show that majority of them are significant at 0.025 level (1-tailed) except for the correlations between the two variables (i.e. HR 10 and HR12) and others, which means that the 26 items are not totally independent. At the same time, Bartlett's test of Sphericity result (approximately Chi-Square = 2208.957 with degree of freedom = 325, at significant level $P < 0.01$) is evident that "all the 26 observed variables of HR practices are independent" is rejected. The result of Kaiser-Meyer-Olkin measure of sampling adequacy ($0.9 > 0.8$) provides the evidence of good homogeneity of variables. All the three tests above allow exploratory factor analysis to be conducted.
- (2) Principle axis factoring method is chosen to extract common factors, i.e. estimating factors from the correlation matrix of measured variables to extract factors that account for the maximum possible variance in the observed variables, and the total variance explained shows in Appendix IV-3;

- (3) Number of factors to retain for rotation: the cut-off near eigenvalue ($= 1.00$) is adopted to choose the number of factors retained for rotation (Floyd and Widaman, 1995), e.g. the initial eigenvalue of factor6=1.091 and factor7=0.857, and the unrotated 6 factors cumulatively explain 65% of variance; simultaneously, the scree test plot(refer to Appendix IV-3) is inspected visually, and the break point at number 7 shows the curve flattens out (i.e. an ‘elbow’ in the scree plot), which also indicates 6 factors retained for rotation is accepted.
- (4) Varimax method (i.e. factors are kept uncorrelated) is chosen to rotate factors to simplify and clarify the data structure, which (compared with oblique rotation method) can produce more interpretable results. The results of rotated factor matrix are showed in Table 5-2, in which weak loading scores (less than 0.32, Tabachnick and Fidell, 2001) and the lower scores (the ‘cross-loading’ item which loads at 0.32 or higher on two or more factors) are deleted.

Based on the results of exploratory factor analysis (refer to Table 5-2), HR11 (i.e. employees have clear career paths in this organization.) loads at three factors with similar score and is dropped from the analysis. Interestingly, HR 14 (performance appraisals are based on objective quantifiable results.), HR15(performance appraisals are based on employee’s behaviours.) and HR16 (employee appraisals emphasize long term and group-based achievement.) are observed variables of “appraisal practice”, but these three variables (with loading score of 0.498, 0.429 and 0.516 respectively) load on factor 1, which has the other seven strong loaders (better than 0.50) and can be identified as “employment relation practice” (i.e. practices of job design and participation according to Bamberger and Meshoulam (2000)). In order to ensure the factor purity of the measurement model, these three items (i.e. HR14-16) are discarded. The loading value of HR12 (employees in this job can be expected to stay with this organization for as long as they wish.) and HR13 (job security is almost guaranteed to employees in this job.) on factor 5 (security practice) is negative, which indicates that these two items are not appropriate in the context of Chinese construction SOEs and should be removed from the measurement instrument.

Table 5- 2: EFA of HR practices: rotated factor matrix^{a,b}

Construct Items	Factor						Item-total Correlation	Cronbach's α
	1	2	3	4	5	6		
HR1				.623			.428	Staffing (HR1-4) $\alpha = 0.674$
HR2				.550			.466	
HR3				.724			.577	
HR4				.486			.386	
HR5		.746					.714	Training (HR5-8) $\alpha = 0.860$
HR6		.757					.750	
HR7		.764					.779	
HR8		.571					.591	
HR9						.433	.398	Mobility (HR9-10) $\alpha = 0.570$
HR10						.666	.398	
HR11 ^c	.355	.380	.376					
HR12					-.670			
HR13					-.366			
HR14	.498							
HR15	.429							
HR16	.516							
HR17			.652				.596	Rewards (HR17-19) $\alpha = 0.754$
HR18			.702				.619	
HR19			.622				.538	
HR20	.595						.580	Employment Relation (HR20-26) $\alpha = 0.850$
HR21	.513						.576	
HR22	.506						.539	
HR23	.582						.677	
HR24	.569						.597	
HR25	.633						.650	
HR26	.702						.653	
Eigenvalues	9.926	1.936	1.470	1.375	1.226	1.091		
Variance Extracted(%)	15.954	12.585	9.803	9.417	4.091	3.295		
Cumulative Variance Extracted(%)	15.594	28.538	38.342	47.759	51.849	55.144		

Note: Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

b. Only cases for the first half data set are used in the analysis phase.

c. The item is removed from the instrument.

EFA, exploratory factor analysis; HR, human resource.

Hence, five factors to manifest HR practices are extracted and retained, i.e., employment relation (HR20-HR26), training (HR5-HR8), staffing (HR1-HR4), rewards (HR17-HR19) and mobility (HR9 and HR10). The extracted factors are consistent with Bamberger and Meshoulam's (2000) theoretical HR practices configuration, and Sun, et al.'s (2007) empirical work. And, the five factors after rotation account for 55% of variance with HR practice measurement.

Then, Cronbach's alpha (i.e. form of internal consistency reliability coefficient) and item-total correlation (i.e. additional information to check whether any item is not consistent with the rest of the scale) of the five factors' scale are tested, and the results are listed in the last two columns at Table 5-2. Cronbach's alphas of three factors (i.e. training, rewards, and employment relation) exceed Nunnally's (1978) criterion of 0.7, and all the item-total correlations of the three factors exceed 0.5 (Netemeyer, et al, 2003), both of which indicate that observed variables of these three factors are internally consistent. Cronbach's alpha of mobility is 0.570 (<0.7), which means the observed variables are not measuring the same factor, so the two items (i.e. HR9-10) are removed from the HR practices measurement instrument. Cronbach's alpha of staffing is 0.674 (close to 0.7), and three of four items' item-total correlations below 0.5, which need careful check in addition with inter-item correlation between the four observed variables (i.e. HR1-4, refer to Appendix IV-3). The inter-item correlations relating to HR1 and HR4 are lower than 0.4 (Clark and Watson, 1995, Ding and Ng, 2008), and the item-total correlation of HR1 and HR4 are 0.428 and 0.386 (<0.5), so these two items (HR1 and HR4) are deleted to purify the measurement of staffing practice.

Finally, four factors, i.e. employment relation (HR20-26), training (HR5-8), staffing (HR2-3) and rewards (HR17-19), are retained to manifest HR practices according to the results of exploratory factor analysis with the first half-set data. Next, confirmatory factor analysis is employed to evaluate the four-factor model of HR practices with an acceptable fit to data (second half-set), to verify that the operational (i.e. observed) items capture the specific dimensions of HR practices, and to refine the first-order measurement scale with Amos (Analysis of Moment Structures) statistical software (version 18).

Confirmatory factor analysis of first-order HR practices measurement scale

The process of confirmatory factor analysis to assess 4-factor first-order HR practices measurement scale includes two steps: (1) measurement model refinement; (2) reliability and validity assessment of the refined measurement model.

(1) Measurement model refinement

The initial first-order HR practices measurement model is specified in Appendix IV-4. The confirmatory factor analysis is conducted by Amos18 to evaluate the initial model fitness to the data (second half set) by the maximum likelihood estimation method. The first row in Table 5-3 indicates that the initial model and the data didn't fit very well (CFI value 0.898<0.9; TLI value 0.876<0.9).

Then, in order to improve the overall fit, the modification index (MI) is checked, which indicates high error covariance between Item 25 and 26 (MI = 19.097). The contents of item 25 (Employees are provided the opportunity to suggest improvements in the way things are done) and item 26 (Supervisors keep open communications with employees in this job) show similar meaning, so item 26 is deleted as revised model. The revised model is assessed again, goodness-of-fit indices of which are shown in the second row of Table 5-3. It can be seen that the revised model yields a more satisfactory model-data-fit statistics than the initial model.

Table 5- 3: Goodness-of-fit indices for HR practices' first order measurement model

Model	No. of observed items	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Initial	16	195.69	98	1.997	0.0653	0.078	0.898	0.901	0.876
Revised	15, deleting HR26	163.71	84	1.949	0.0632	0.077	0.908	0.910	0.885
Levels of acceptable fit					≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Note. Initial model: High modification index indicated high error covariance between Item 25 and 26 (MI = 19.097). Analysis of the content of Item 25 also showed its similarity to Item 26. SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

(2) Reliability and validity assessment of the refined measurement model

In order to further assess the strength of the revised measurement model, unidimensionality, convergent validity, and discriminant validity of the first-order HR practices construct are examined, which is consistent with previous empirical studies, e.g. Teo, et al. (2006), Chang and Chen (2008).

Unidimensionality is crucial in theory testing, and is defined as “the existence of one latent trait or construct underlying a set of measures (Anderson, et al., 1987)”. That

the observed variables as indicators to measure a latent construct should be unidimensional is a necessary condition for estimation in measurement model (Kumar and Dillon, 1987). The assessment of unidimensionality includes internal consistency and external consistency. The model-fit indices can be used to assess the unidimensionality of construct operationalization (Anderson, et al., 1987; Purvis, et al., 2001), e.g. standard root mean square residual, comparative fit index, etc. The desirable results of goodness-of-fit indices in the second row of Table 5-3 provide evidence of unidimensionality of scale items in the refined measurement model.

Table 5- 4: Convergent validity of four factors of HR practices first-order measurement model

Factor	Items	CFA ^a Loading	P- Value ^b
<i>Staffing</i> (C.R.= 0.61) ^c	HR2 Long-term employee potential is emphasized.	0.857	***
	HR3 The Members of the department or project team of which the new worker will be part, participate in the selection of candidates.	0.437	***
<i>Training</i> (C.R.= 0.83)	HR5 Formal training programs are provided for employees.	0.745	***
	HR6 There are comprehensive training policies and programs.	0.844	***
	HR7 There are formal training programs to teach new staffs the skills they need to perform their job.	0.877	***
	HR8 There are training for problem-solving ability.	0.604	***
<i>Rewards</i> (C.R.= 0.74)	HR17 The organization has a mixed system of rewarding: fixed + variable.	0.852	***
	HR18 Individuals in this job receive bonuses based on the profit of the organization or the project.	0.685	***
	HR19 The company offers incentives to its employees related to their performance.	0.540	***
<i>Employment relation</i> (C.R.= 0.79)	HR20 The duties in his job are clearly defined.	0.533	***
	HR21 The job has an up-to-date description.	0.597	***
	HR22 The job description for a position accurately describes all of the duties performed by individual employees.	0.625	***
	HR23 Employees in this job are often asked by their supervisor to participate in decisions.	0.763	***
	HR24 Inform the employees about economic and strategic information.	0.642	***
	HR25 Employees are provided the opportunity to suggest improvements in the way things are done.	0.564	***

^a Standard Factor loading (λ value) from confirmatory factor analysis

^b P-Value is significant at $p < 0.05$, ***, $P < 0.001$

^c CR = composite reliability. $CR = (\text{sum of standardised loading})^2 / ((\text{sum of standardised loading})^2 + (\text{sum of indicator measurement error}))$

Convergent validity is assessed by two criteria (Gerbing and Anderson, 1988; Chang and Chen, 2008): standard factor loadings of observed items on the respective construct and significant level (i.e. reliability of observed items), and composite reliability of constructs (i.e. the reliability of a summated scale). The results are

shown in Table 5-4. All the significant factor loadings (i.e. λ value) of observed items are above 0.40 (Bollen, 1989; Taylor and Todd, 1995) at $p < 0.001$ level, which indicates that all the observed items exhibit satisfactory reliability. Then, the composite reliability score is calculated by Fornell and Larcker's (1981) formula. As Table 5-4 shows, the indices of four factors' composite reliability is greater than 0.6 (Hair, et al., 1998; Chang and Chen, 2008). So, both criteria demonstrate adequate convergent validity of the first-order HR practices measurement scale.

Discriminant validity refers to testing statistically whether two constructs differ, which means that the observed variables for different latent constructs should not be highly correlated to conclude that they are measuring the same thing. The violation of discriminant validity occurs when there is conceptual overlap between two latent constructs. According to Cho (2006), if the inter-item correlations between items within one factor are higher than that between items measuring different factors, the measurement scale can be considered with adequate discriminant validity. Table 5-5 presents the squared inter-item correlations among the observed variables in HR measurement scale. From the results, the correlation score between two items within the same factor is higher than that between items from different factors, e.g. the squared correlation between HR2 and HR3 (0.25) is higher than other correlation score related to HR2 and HR3. Hence, it can be concluded that discriminant validity of HR practices measurement is justified.

Table 5- 5: Squared inter-item correlation among the HR practices construct

	HR2	HR3	HR5	HR6	HR7	HR8	HR17	HR18	HR19	HR20	HR21	HR22	HR23	HR24	HR25
HR2	1.00														
HR3	0.25	1.00													
HR5	0.13	0.05	1.00												
HR6	0.16	0.08	0.44	1.00											
HR7	0.19	0.07	0.44	0.52	1.00										
HR8	0.17	0.20	0.24	0.26	0.32	1.00									
HR17	0.05	0.05	0.05	0.04	0.08	0.08	1.00								
HR18	0.04	0.06	0.03	0.02	0.04	0.04	0.32	1.00							
HR19	0.02	0.09	0.04	0.02	0.04	0.13	0.22	0.24	1.00						
HR20	0.09	0.07	0.12	0.12	0.14	0.10	0.09	0.08	0.06	1.00					
HR21	0.10	0.11	0.08	0.13	0.16	0.18	0.08	0.08	0.10	0.18	1.00				
HR22	0.10	0.04	0.12	0.17	0.27	0.18	0.12	0.04	0.01	0.19	0.29	1.00			
HR23	0.16	0.08	0.08	0.13	0.17	0.14	0.15	0.10	0.09	0.17	0.22	0.22	1.00		
HR24	0.11	0.12	0.12	0.16	0.17	0.17	0.07	0.05	0.10	0.17	0.14	0.12	0.23	1.00	
HR25	0.13	0.18	0.12	0.11	0.12	0.13	0.08	0.07	0.12	0.20	0.14	0.09	0.28	0.28	1.00

Thus, the revised first-order HR practices measurement scale is satisfied in unidimensionality, convergent validity, and discriminant validity. Figure 5-2 shows the unstandardised estimation of the HR practices measurement model with all the first order factors inter-correlated. The goodness-of-fit indices in Table 5-3 (second row) indicate the model fits the data well. The coefficients between observed variables and the related factor are all significant at 0.01 level (detailed estimates of observed variables refer to Appendix IV-4).

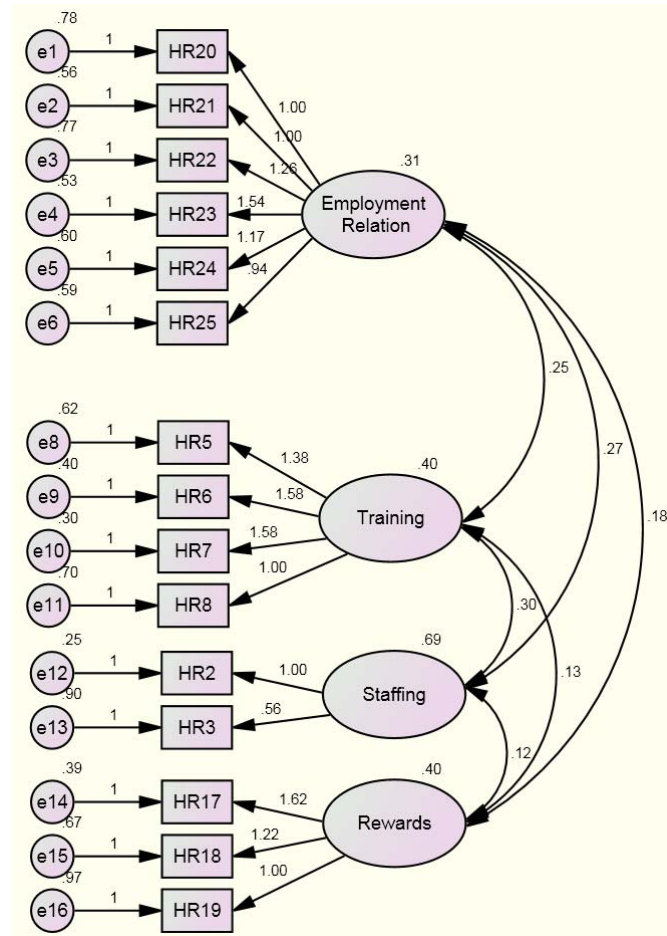


Figure 5- 2: Unstandardised estimates of the first-order HR practices measurement model

Table 5- 6: Correlation and covariance between four factors of HR practices

	Correlation Estimates	Covariance Estimates	S.E.	C.R.	P-Value
Employment_ Relation <--> Training	.710	.251	.057	4.388	***
Employment_ Relation <--> Staffing	.589	.271	.063	4.332	***
Employment_ Relation <--> Rewards	.513	.180	.051	3.526	***
Training <--> Staffing	.563	.296	.065	4.590	***
Training <--> Rewards	.316	.127	.045	2.816	.005
Staffing <--> Rewards	.236	.123	.057	2.167	.030

Legends: S.E. = standard error of the covariance; C.R. = critical ratio;

P-value is significant at $P < 0.05$, ***, $P < 0.001$.

Table 5-6 shows the correlation and covariance between the four factors of HR practices, which signify that the four factors are highly correlated, with correlation coefficients from .236 to .710 at $P < 0.05$ level. And the inter-correlation between the four factors indicates statistically the existence of a higher level order construct, i.e. human resource practices, which is consistent with the conceptual model.

In the next sub-section, second-order HR practices measurement scale is assessed by confirmatory factor analysis, again, with goodness-of-fit indices (Chin, 1998; Byrne, 2001).

Second-order HR practices measurement scale

According to Chin (1998), second-order measurement scale consists of “a higher order latent variable that is modelled as causally impacting a number of first order latent variables”. So, the second-order latent variable is not directly connected to any measured items. The purpose of second-order measurement test is to identify a general construct (i.e. HR practices) underlying the first order factors (employment relation, training, staffing and rewards). The second-order HR practices measurement model is present in Appendix IV-5. Table 5-7 show the goodness-of fit indices, which is desirable and acceptable, indicate that the second-order HR practices model fits the data well and the higher level construct (i.e. HR practices) is identified.

Table 5- 7: Goodness-of-fit indices for HR practices' second-order measurement model

	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Second-order model	249.63	86	2.903	0.0582	0.077	0.918	0.919	0.900
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Legend: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

Figure 5-3 presents the estimates of unstandardised path coefficients and variances at $P < 0.001$ level by the maximum likelihood method (the standardised path diagram and estimates output refer to Appendix IV-5).

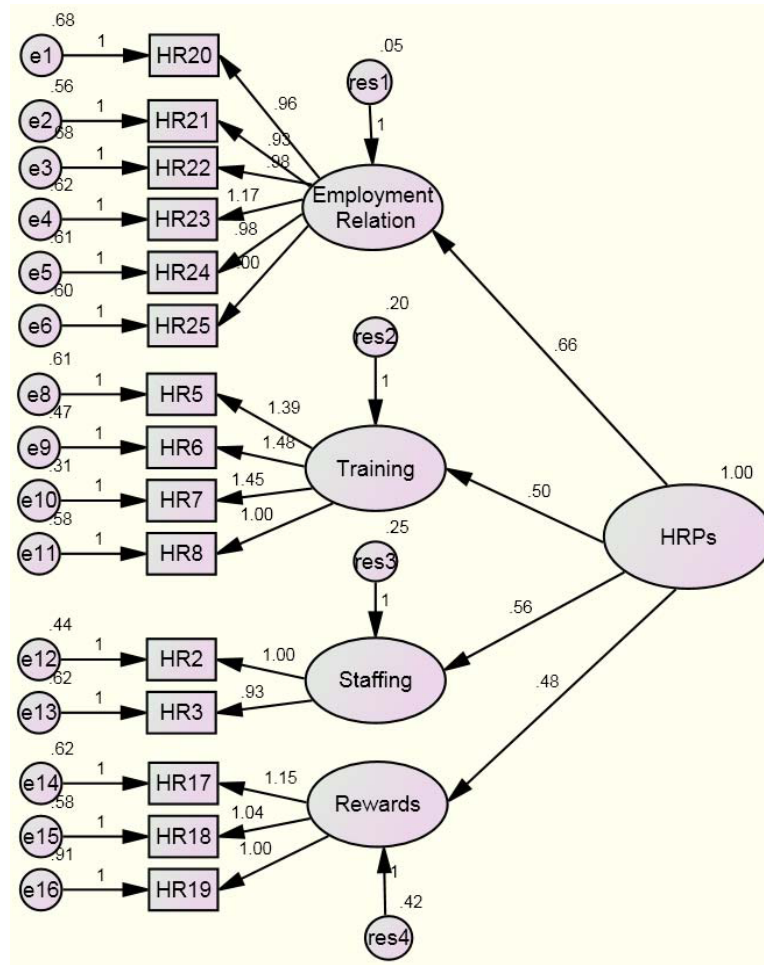


Figure 5- 3: Unstandardised estimates of the second-order HR practices measurement model

In sum, HR practices measurement model is assessed firstly by exploratory factor analysis with the first-half set data, which measures HR practices by four factors, i.e. staffing, training, rewards, and employment relation; then, the first order measurement model is refined by confirmatory factor analysis with an acceptable fit to the second-half set data; at last, the second-order HR measurement model is developed with desirable goodness-of-fit indices. In the following sub-sections, because organisational learning, organisational performance, employee's in-role behaviour and OCB in this study is measured by a single factor, the initial reliability of each construct is tested by Cronbach's alpha, inter-item correlation and item-total correlation firstly, and then confirmation factor analysis is adopted to refine the measurement model with assessment of reliability and validity.

5.4.2 Organisational learning

The reliability of organisational learning measurement model is tested by Cronbach's alpha ($0.901 > 0.7$, Nunnally, 1978), which is satisfied to indicate the internal consistency among the observed variables. The inter-item and item-total correlation are also adopted to justify the scale reliability, refer to Table 5-8. The coefficients of item-total correlation of all 11 items are higher than 0.50 (Netemeyer, et al., 2003), which means that each item is consistent with the rest items of the scale. Regarding the inter-item correlation, the majority of the coefficients are higher or close to 0.4 (Clark and Watson, 1995). All the three indicators show that the reliability of the organisational learning measurement scale is satisfied.

Table 5- 8: Inter-item and item-total correlation between observed items of organisational learning

	Mean	S.D.	OL1	OL2	OL3	OL4	OL5	OL6	OL7	OL8	OL9	OL10	OL11
OL1	3.68	1.047	(.537)										
OL2	3.26	1.029	.470	(.673)									
OL3	3.05	1.189	.418	.576	(.642)								
OL4	3.32	1.094	.443	.560	.534	(.721)							
OL5	3.31	1.075	.412	.524	.516	.635	(.691)						
OL6	2.77	1.212	.265	.415	.463	.464	.444	(.588)					
OL7	3.29	1.044	.386	.561	.487	.584	.646	.509	(.737)				
OL8	3.48	1.004	.405	.428	.380	.532	.497	.384	.571	(.635)			
OL9	3.47	1.000	.436	.444	.431	.525	.464	.450	.567	.536	(.677)		
OL10	3.74	.993	.419	.435	.381	.399	.380	.349	.457	.442	.491	(.570)	
OL11	2.87	1.198	.269	.376	.393	.428	.392	.471	.443	.389	.482	.376	(.558)

Note: Figures in parentheses are item-total correlation coefficients.

OL = organisational learning; S.D. = standard deviation.

Confirmatory factor analysis is adopted to assess the validity of the organisational learning measurement model. Firstly, the measurement model is specified (refer to Figure 5-4) and conducted by Amos 18.0 to evaluate the model fitness to the data by the maximum likelihood method. Goodness-of-fit indices in Table 5-9 show that the model fits the data very well. The desirable results of goodness-of-fit indices also justify the unidimensionality of the scale items that one factor (i.e. organisational learning) can underlie the eleven observed items.

Table 5- 9: Goodness-of-fit indices for organisational learning measurement model

	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Measurement model	117.885	44	2.679	0.042	0.072	0.953	0.953	0.941
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Legend: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

Then, the estimates of the measurement model are shown in Figure 5-4 and Table 5-10. All the standard factor loadings of observed items on the construct (i.e. organisational learning) in Table 5-10 are higher than 0.5 at $P < 0.001$ level (Taylor and Todd, 1995), which demonstrate the convergent validity of the measurement scale.

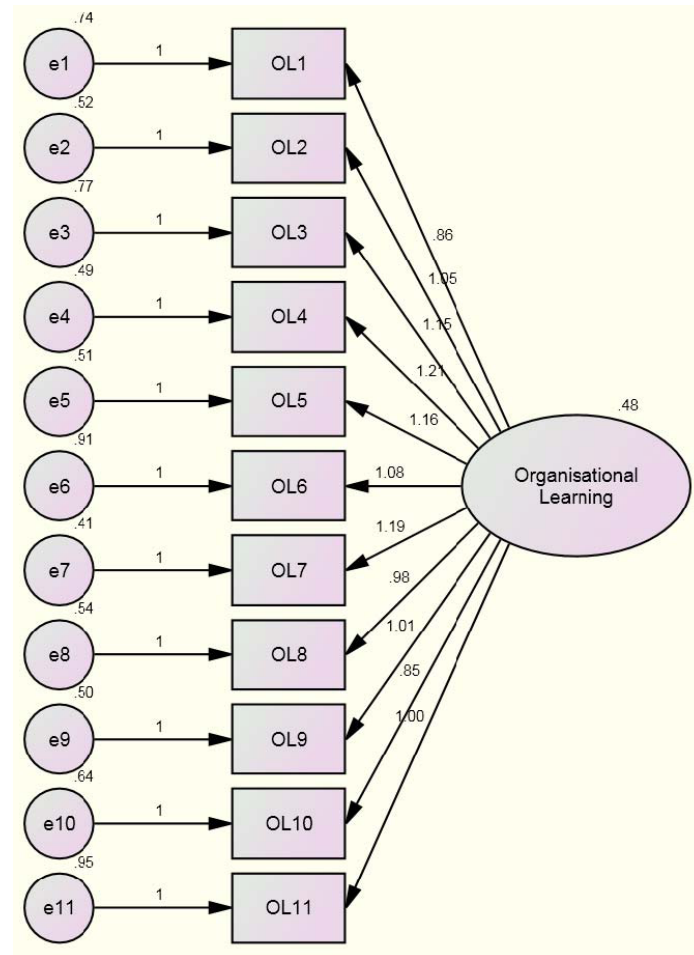


Figure 5- 4: Unstandardised estimates of organisational learning measurement model

Table 5- 10: Estimates of factor loadings in organisational learning measurement model

			Standardised estimate	Unstandardised estimate	S.E.	C.R.	P- Value
OL11	<--	Organisational Learning	0.580	1.000			
OL10	<--	Organisational Learning	0.592	0.845	0.097	8.750	***
OL9	<--	Organisational Learning	0.704	1.013	0.102	9.881	***
OL8	<--	Organisational Learning	0.678	0.979	0.102	9.637	***
OL7	<--	Organisational Learning	0.789	1.186	0.112	10.626	***
OL6	<--	Organisational Learning	0.618	1.078	0.119	9.031	***
OL5	<--	Organisational Learning	0.749	1.158	0.113	10.286	***
OL4	<--	Organisational Learning	0.770	1.213	0.116	10.470	***
OL3	<--	Organisational Learning	0.673	1.152	0.120	9.593	***
OL2	<--	Organisational Learning	0.710	1.052	0.106	9.941	***
OL1	<--	Organisational Learning	0.569	0.857	0.101	8.496	***

Note: S.E. = standard error of the covariance; C.R. = critical ratio;

P-value is significant at $P < 0.05$, ***, $P < 0.001$.

5.4.3 Organisational performance

According to Cronbach's alpha coefficient ($0.890 > 0.7$, Nunnally, 1978) which indicates the internal consistency among the observed variables, the reliability of the organisational performance measurement model is satisfied. The inter-item and item-total correlation are also tested to justify the scale reliability (refer to Table 5-11). The coefficients of item-total correlation of all 10 items are higher than 0.50 (Netemeyer, et al., 2003), which means that each item is consistent with the rest of the items in the scale. Regarding the inter-item correlations, however, most of the coefficients are higher or close to 0.4 (Clark and Watson, 1995) except for the ones of OP1 related inter-item correlation, e.g. inter-item correlation coefficients between OP1 and six OP items (OP5-OP10) are below 0.4. So, item OP1 (Revenue growth of your company over the past three years) is deleted to improve the reliability of the measurement scale.

Table 5- 11: Inter-item correlation of organisational performance

	Mean	S.D.	OP1	OP2	OP3	OP4	OP5	OP6	OP7	OP8	OP9	OP10
OP1	3.66	.883	(.530)									
OP2	3.29	.908	.567	(.688)								
OP3	3.40	.909	.625	.627	(.673)							
OP4	3.55	1.027	.448	.556	.496	(.645)						
OP5	2.98	.990	.291	.517	.399	.508	(.611)					
OP6	3.44	.939	.332	.489	.520	.496	.556	(.686)				
OP7	3.65	.849	.354	.438	.439	.408	.430	.493	(.643)			
OP8	3.22	.890	.275	.446	.408	.488	.459	.532	.464	(.634)		
OP9	3.17	.874	.247	.405	.404	.385	.402	.488	.492	.533	(.598)	
OP10	3.79	.782	.295	.302	.365	.320	.343	.453	.637	.461	.522	(.566)

Note: Figures in parentheses are item-total correlation coefficients.

OP=organisational Performance; S.D.=standard deviation

Then, the validity of the organisational performance measurement model is assessed by confirmatory factor analysis. The original measurement model of organisational performance is given in Appendix IV-6. The first row of goodness-of-fit indices in Table 5-12 indicates that the initial model did not fit the data very well ($RMSEA = 0.125 > 0.1$; values of CFI, IFI and TLI are all below 0.9). So, the modification index (MI) is checked to improve the overall fit. MI between Items OP7 and OP10 is very

high (53.511), which means that there is high error covariance between these two observed variables. The content of OP7 (The satisfaction of clients of your company performance over the past 3 years.) and OP10 (The construction quality of your company performance over the past 3 years.) show similarity, because generally the quality of the project is one of the most important factors to affect the satisfaction of clients and the correlation coefficient of 0.637 at significant level ($P < 0.01$) justifies the high correlation. Furthermore, because the Univariate Normality test result in section 5.3.2 shows OP10 has a skew problem, OP10 is deleted to improve the fitness of the measurement model to the data.

Table 5- 12: Goodness-of-fit indices for organisational performance measurement model

Model	No. of observed items	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Initial	9	163.902	27	6.070	0.061	0.125	0.891	0.892	0.854
Revised	8, deleting OP10	76.717	20	3.836	0.043	0.093	0.946	0.946	0.924
Levels of acceptable fit					≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Note. Initial model: High modification index indicated high error covariance between Item OP7 and OP10 ($MI = 53.511$). Analysis of the content of Item OP7 also showed its similarity to Item OP10. SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

The estimates of the revised measurement model are shown in Figure 5-5 and Table 5-13. All the standard factor loadings of observed items on the construct (i.e. organisational performance) in Table 5-13 are higher than 0.6 at $P < 0.001$ level (Taylor and Todd, 1995), which demonstrate the convergent validity of the measurement scale.

Table 5- 13: Estimations of factor loadings in revised organisational performance measurement model

			Standardised estimate	Unstandardised estimate	S.E.	C.R.	P-Value
OP9	<--	Org. Performance	0.633	0.838	0.078	10.768	***
OP8	<--	Org. Performance	0.685	0.923	0.079	11.646	***
OP7	<--	Org. Performance	0.646	0.830	0.076	10.994	***
OP6	<--	Org. Performance	0.747	1.061	0.084	12.693	***
OP5	<--	Org. Performance	0.683	1.024	0.088	11.621	***
OP4	<--	Org. Performance	0.697	1.084	0.091	11.858	***
OP3	<--	Org. Performance	0.691	0.950	0.081	11.750	***
OP2	<--	Org. Performance	0.728	1.000			

Note: S.E. = standard error of the covariance; C.R. = critical ratio; Org. = Organisational; P-value is significant at $P < 0.05$, ***, $P < 0.001$.

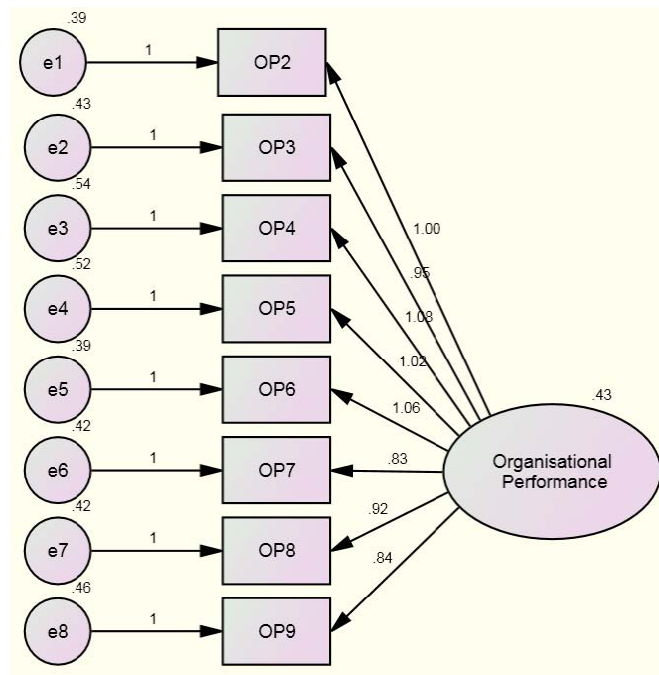


Figure 5- 5: Unstandardised estimation of revised organisational performance measurement model

5.4.4 Individual behaviour

Similar to the analysis procedure for organisational learning and performance, the measurement models of in-role behaviour and OCB are assessed respectively in the following sections.

In-Role behaviour

After the univariate normality test in section 5.3.2, IB3 and IB7 are deleted because of extreme nonnormality problem. Five items are therefore left for further analysis in the measurement scale development.

Table 5- 14: Inter-item correlation of individual in-role behaviour measurement (original)

	Mean	S.D.	IB1	IB2	IB4	IB5	IB6
IB1	4.12	.772	(.617)				
IB2	4.10	.866	.682	(.618)			
IB4	4.05	.808	.564	.609	(.540)		
IB5	4.13	.872	.292	.267	.262	(.102)	
IB6	3.71	.959	.054	.057	.005	-.002	(.006)

Note: Figures in parentheses are item-total correlation coefficients.

IB=individual behaviour; S.D.=standard deviation

Cronbach's alpha coefficient of individual in-role behaviour measurement scale is 0.636 (<0.7). The item-total correlation of IB5 (0.102) and IB6 (0.006) in Table 5-14 is very much lower than 0.5 (Netemeyer, et al., 2003) and the inter-item correlation coefficients related to IB5 and IB6 are lower than 0.4 (Clark and Watson, 1995). All the three tests demonstrate that IB5 and IB6 are not internally consistent with the other three items. So, items IB5 and IB6 are deleted to improve the scale reliability.

Then, Cronbach's alpha coefficient of revised individual in-role behaviour measurement scale is 0.829. Inter-item and item-total correlation are conducted again, in Table 5-15, which indicate the internal consistency among the three items.

Table 5- 15: Inter-item correlation of individual in-role behaviour measurement (revised)

	IB1	IB2	IB4
IB1	(.697)		
IB2	.682	(.729)	
IB4	.564	.609	(.640)

Note: Figures in parentheses are item-total correlation coefficients.

The validity of measurement scale of in-role behaviour is assessed by confirmatory factor analysis, and the goodness-of-fit indices compared with acceptable level are present in Table 5-16. The goodness-of-fit indices indicate the in-role behaviour measurement model is saturated, because only three observed variables underlying the factor. Under this situation, some fit indices cannot be calculated. According to CFI ($1.0 > 0.9$) and TLI ($1.0 > 0.9$), it can be concluded that the model fits data very well.

Table 5- 16: Goodness-of-fit indices for individual in-role behaviour measurement model

	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Measurement model	.000	0		.000		1.000		1.000
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Legend: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

The estimates of revised in-role behaviour measurement model are shown in Figure 5-6 and Table 5-17. All the standard factor loadings of observed items on the construct (i.e. in-role behaviour) in Table 5-17 are higher than 0.7 at $P < 0.001$ level (Taylor and Todd, 1995), which demonstrate the convergent validity of measurement scale.

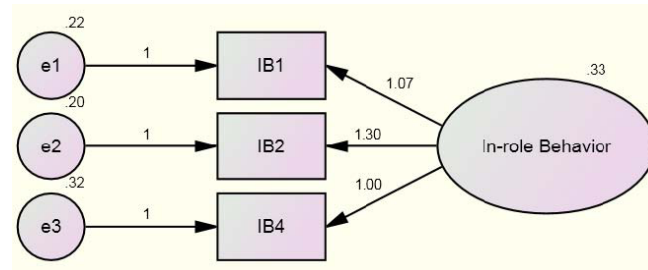


Figure 5- 6: Unstandardised estimation of in-role behaviour measurement model

Table 5- 17: Estimates of factor loadings in revised in-role behaviour measurement model

			Standardized estimate	Unstandardised estimate	S.E.	C.R.	P-Value
IB4	<--	In-role Behavior	0.709	1			
IB2	<--	In-role Behavior	0.858	1.297	0.105	12.353	***
IB1	<--	In-role Behavior	0.795	1.07	0.087	12.345	***

Note: S.E. = standard error of the covariance; C.R. = critical ratio;

P-value is significant at $P < 0.05$, ***, $P < 0.001$.

OCB

In section 5.3.2 (univariate normality test), IB16, IB17 and IB18 are deleted because of extreme nonnormality problem. Eleven items are left for further analysis in OCB measurement scale development. Cronbach's alpha of OCB measurement is 0.782.

Based on the results of inter-item and item-total correlation of OCB measurement model in Table 5-18, only four items' (i.e. IB10-13) item-total correlation coefficients > 0.5 , which are left for further confirmatory factor analysis, and the other items are deleted. Item IB15's item-total correlation coefficient (0.498) is close to 0.5, but because it is the only item left to measure OCBO, which would have reliability problem, IB15 is discarded. Hence, the four items in Table 5-19 (i.e. IB10-13) are retained to manifest OCBI in further analysis.

Table 5- 18: Inter-item and item-total correlation of OCB measurement model (original)

	Mean	S.D.	IB8	IB9	IB10	IB11	IB12	IB13	IB14	IB15	IB19	IB20	IB21
IB8	2.96	1.022	(.405)										
IB9	3.21	.988	.478	(.445)									
IB10	3.44	1.079	.394	.376	(.582)								
IB11	3.50	.944	.233	.412	.424	(.540)							
IB12	3.70	.933	.344	.295	.470	.420	(.616)						
IB13	3.32	.838	.253	.308	.403	.524	.508	(.567)					
IB14	3.54	.879	.173	.206	.281	.245	.421	.366	(.433)				
IB15	3.79	.876	.165	.280	.354	.377	.338	.328	.312	(.498)			
IB19	4.04	1.013	.070	.050	.084	.048	.183	.129	.154	.149	(.185)		
IB20	3.97	1.009	-.019	.145	.172	.328	.164	.210	.145	.304	-.005	(.268)	
IB21	3.67	1.110	.210	.012	.300	.078	.301	.182	.205	.227	.243	.165	(.333)

Note: Figures in parentheses are item-total correlation coefficients.

IB=individual behaviour; S.D.=standard deviation

Inter-item and item-total correlation test are conducted again to OCBI measurement model, showed in Table 5-19. All the item-total correlation coefficients are above 0.5 and all the inter-item correlation coefficients are above 0.4. Cronbach's alpha of OCBI measurement scale is $0.766 > 0.7$ (Nunnally, 1978). So, the reliability of OCBI measurement scale is acceptable.

Table 5- 19: Inter-item correlation of OCBI measurement model (revised)

	IB10	IB11	IB12	IB13
IB10	(.536)			
IB11	.424	(.565)		
IB12	.470	.420	(.584)	
IB13	.403	.524	.508	(.600)

Note: Figures in parentheses are item-total correlation coefficients.

IB=individual behaviour; S.D.=standard deviation

Then, confirmatory factor analysis is adopted to assess the validity of OCBI measurement model. The measurement model is specified (refer to Figure 5-7) and conducted to evaluate the model fitness to the data by the maximum likelihood method. Goodness-of-fit indices in Table 5-20 show that the model fits the data very well. The desirable results of goodness-of-fit indices also justify the unidimensionality of the scale items that one factor (i.e. OCBI) can underlie the four observed items.

Table 5- 20: Goodness-of-fit indices for individual OCBI measurement model

	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Measurement model	8.493	2	4.246	.027	.100	.980	.980	.940
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Legend: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

The estimates of OCBI measurement model are shown in Figure 5-7 and Table 5-21. All the standard factor loadings of observed items on the construct (i.e. OCBI) in Table 5-21 are higher than 0.6 at $P < 0.001$ level (Taylor and Todd, 1995), which demonstrate the convergent validity of measurement scale.

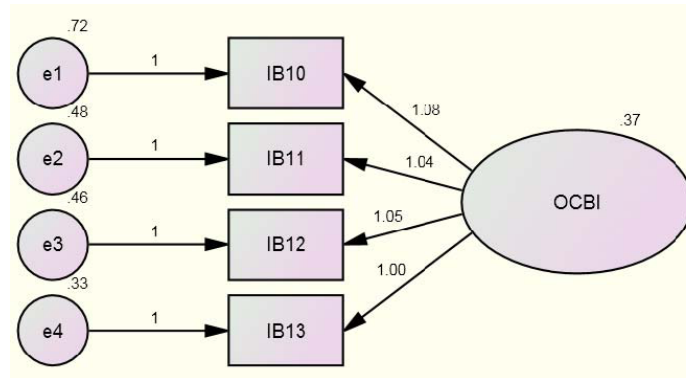


Figure 5- 7: Unstandardised estimation of OCBI measurement model

Table 5- 21: Estimates of factor loadings in OCBI measurement model

			Standardised estimate	Unstandardised estimate	S.E.	C.R.	P- Value
IB13	<---	OCBI	0.731	1.000			
IB12	<---	OCBI	0.688	1.048	0.106	9.847	***
IB11	<---	OCBI	0.675	1.039	0.107	9.734	***
IB10	<---	OCBI	0.615	1.083	0.119	9.105	***

Note: S.E. = standard error of the covariance; C.R. = critical ratio;
P-value is significant at $P < 0.05$, ***, $P < 0.001$.

In summary, the reliability and validity of constructs (i.e. HR practices, organisational learning, organisational performance, individual in-role behaviour and OCBI) are evaluated, the measurement model of the constructs are developed by confirmatory factor analysis in Amos 18.0. The measurement models are used to test the hypotheses (i.e. path analysis) in next section.

5.5 Structural equation models and Hypotheses testing

As discussed in section 4.1, Hypothesis one is postulated as:

HR practices enhance organisational performance through their influences on employees' behaviours and organisational learning.

Then, H1-a and H1-b are formulated to investigate two mediating variables when HR practices enhance organisational performance, i.e. employees' behaviour (including in-role behaviour and OCB), and organisational learning respectively.

A third variable, as a mediator function refer to Figure 5-8, represents that “the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest (Baron and Kenny, 1986)”. One example of mediation hypothesis is Woodworth’s (1928) stimulus-organism-response (S-O-R) model which means that the effects of stimuli on behaviour are mediated by internal transformation process within organism.

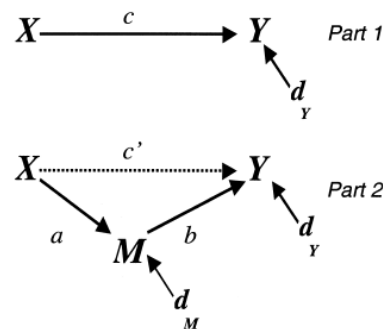


Figure 5- 8: Mediator model

(Source: Shrout and Bolger, 2002, p.423)

Note: Path models showing total effect (Part 1) and mediated effect (Part 2) of X on Y. When mediation occurs, the c' path in Part 2 is smaller than the c path in Part 1, as indicated by dashed lines. Residual terms are displayed as d effects.

From statistic perspective, in order to test the mediation model, three regression equations have to be estimated (Baron and Kenny, 1986), refer to Figure 5-8:

- (1) regression of the mediator on the independent variable (i.e. path a);
- (2) regression of the dependent variable on the independent variable (i.e. path c);
- (3) regression of the dependent variable on both independent variable and the mediator (i.e. path $a+b$).

The mediation occurs if previous significant relation (path c) between independent variable (X) and the dependent variable (Y) is no longer significant (path c') when controlling for the mediator (M) (Baron and Kenny, 1986; Frazier, et al., 2004). This statistical mediation analysis has been adopted in several empirical studies, e.g. Wei, et al., 2003; Frazier, et al., 2004; Wei, et al., 2004; Hopwood, 2007.

Based on Baron and Kenny’s (1986) mediator analysis approach, three steps are followed to test H1-a and H1-b according to the regression results of the structural equations, at the condition of acceptable model fit to data.

5.5.1 H1-a: The mediating effects of in-role behaviour and OCBI on the relationship between HR practices and organisational performance

As explained in section 4.1, postulated causal relations among HR practices, employees' behaviour (including in-role behaviour and OCBI), and organisational performance are developed from the resource-based view, the organisational role behaviour perspective and previous empirical studies, refer to Figure 4-1. Because individual employees who possess the tacit knowledge to satisfy their task requirements and achieve the project goals are the essential resource of the Chinese construction enterprises, HR practices (e.g. training and intrinsic rewards) may influence and shape individuals' skills, attitudes, and behaviours in task performance to enhance experience and organisational capability. Based on the measurement model developed in the previous section, the postulated H1-a model is shown in Figure 5-11. The mediator model test follows three steps.

Step One: HR practices affect in-role behaviour and OCBI

Structural equation model is implemented to assess the causal structure linking HR practices (independent variable) to in-role behaviour and OCBI (mediators), by the maximum likelihood estimation method in Amos 18.0. Firstly, the model fit is assessed by goodness-of-fit indices, shown in Table 5-22. Selected multiple goodness-of-fit statistics (i.e. SRMR, RMSEA, CFI, etc.) in first row of Table 5-22 show that the revised model is marginally adequate (SRMR = 0.085 < 0.1; RMSEA = 0.070 < 0.1; CFI = 0.889 close to 0.9; TLI = 0.874 close to 0.9).

Table 5- 22: Goodness-of-fit indices for path analysis "HR practices and individual behaviour"

Model	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Original model	524.56	203	2.584	.085	.070	.889	.890	.874
Revised model by Connecting e2 and e7	504.24	202	2.496	.084	.068	.896	.897	.881
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Note. Original model: High modification index indicated high error covariance between Item HR21 and HR22 (MI = 18.527).

Legends: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

A review of the modification indices reveals some evidence of misfit in the model (Byrne, 2001, Boomsma, 2000). In order to improve the model fit, model modification is made according to Boomsma's (2000) recommendation that "make subsequent changes one at a time". Model modification should be made according to theoretical rational to avoid purely data-driven model modification (Boomsma, 2000). So, the modification index is checked and reviewed, and the error covariance between HR21 and HR22 is found to be high (MI = 18.527). The value of 18.527 indicates that, if this parameter were to be freely estimated in a subsequent model, the overall χ^2 value would drop by at least this amount (Byrne, 2001). From a substantive perspective, it would seem reasonable that the job which has up-to-date description (HR21), is highly correlated with the job which accurately describes all of the duties performed by individual employees (HR22). Given the meaningfulness of this correlation, the model was reestimated with the covariance between errors of HR21 and HR22 (i.e. e2 and e7) specified as a free parameter. Goodness-of-fit indices of revised model in second row of Table 5-22 show the acceptable model fit to data (CFI = 0.896 close to 0.9 ; IFI = 0.897 close to 0.9).

The output standardised model of HR practices for in-role behaviour and OCBI is shown in Figure 5-9, and the unstandardised, as well as the standardised and maximum likelihood parameter estimates are presented in Table 5-23. All the parameter estimates are statistically significant ($P < 0.001$) and substantively meaningful.

Table 5- 23: Regression weights for "HR practices – individual behaviour (including in-role behaviour and OCBI)" model

Regression Path			Standardised Estimate	Unstandardised Estimate	S.E.	C.R.	P- Value
Employment							
Relation	<---	HR Practices	0.953	0.698	0.057	12.275	***
Training	<---	HR Practices	0.708	0.478	0.05	9.613	***
Staffing	<---	HR Practices	0.773	0.564	0.057	9.95	***
Rewards	<---	HR Practices	0.601	0.486	0.062	7.772	***
In-Role Behaviour	<---	HR Practices	0.286	0.162	0.038	4.266	***
OCBI	<---	HR Practices	0.476	0.298	0.044	6.789	***

Note: S.E. = standard error of the covariance; C.R. = critical ratio;

P-value is significant at $P < 0.05$, ***, $P < 0.001$.

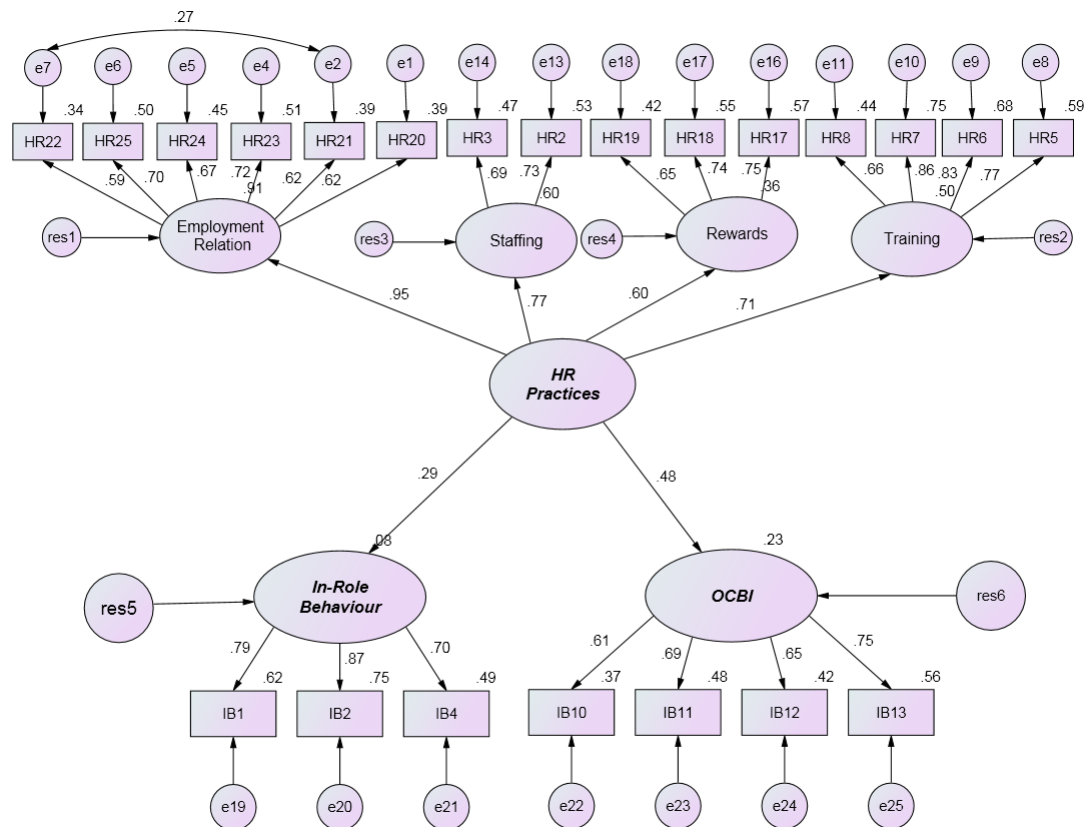


Figure 5- 9: Output standardised path diagram _ “HR practices – individual behaviour (including in-role behaviour and OCBI)” model

Refer to Figure 5-9, the figure above each variable represent the squared multiple correlations, which means the proportion of variance that is explained by the predictors of the variable in question. For example, HR practices serve as predictors of OCBI, and 23% of the variance associated with OCBI is accounted for by HR practices. Likewise, the factor of OCBI explains 37% of the variance associated with its indicator variable IB10 and 56% of the variance associated with its indicator variable IB13. It is important to note that only 8% of the variance associated with in-role behaviour is accounted for by HR practices.

According to Figure 5-9 and Table 5-23, results show that HR practices have a positive significant impact on in-role behaviour ($\beta = 0.29$, $p < 0.001$). Similarly, HR practices have a positive significant impact on OCBI ($\beta = 0.48$, $p < 0.001$). So, HR practices is important to impact and arouse employees’ in-role behaviours (e.g. adopting occupational knowledge and abilities in task related performance), and their OCBI (i.e. immediately benefit specific individuals and indirectly through this means

contribute to the organization, e.g., helping colleagues) which go beyond their task requirements.

Step Two: HR practices affect organisational performance

The structural model of “HR practice and organisational performance” is tested using the maximum-likelihood estimation method. The first row in Table 5-24 shows the original model’s goodness-of-fit indices, which indicate the marginally adequate (SRMR = 0.063 < 0.1; RMSEA = 0.071 < 0.1; CFI = 0.889 close to 0.9; IFI = 0.890 close to 0.9; TLI = 0.875 close to 0.9). Then, a review of the modification indices reveals some evidence of misfit in the model. Following the model modification method in step one, two revised models are developed respectively. The error covariance between OP2 (profit growth) and OP3 (market share) is very high (MI = 34.031). The content of OP2 and OP3 show the high correlation. So, it is meaningful to reestimated with the covariance between errors of OP2 and OP3 (i.e. e26 and e25) specified as a free parameter, refer to revised model 1. Similarly, revised model 2 is reestimated with the covariance between errors of HR21 and HR22 (i.e. e2 and e7, MI = 21.825) specified as a free parameter. Goodness-of-fit indices of revised model2 in third row of Table 5-24 show the statistics improvement and the acceptable model fit to data (SRMR = 0.060 < 0.1; RMSEA = 0.066 < 0.1; CFI = 0.906 > 0.9 ; IFI = 0.907 > 0.9; TLI = 0.894 close to 0.9).

Table 5- 24: Goodness-of-fit indices for path analysis “HR practices and organisational performance” model

Model	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Original model	596.67	225	2.652	.063	.071	.889	.890	.875
Revised model 1 by Connecting e25 and e26	559.88	224	2.499	.061	.068	.900	.901	.887
Revised model 2 by Connecting e2 and e7	536.45	223	2.406	.060	.066	.906	.907	.894
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Note. Original model: High modification index indicated high error covariance between Item OP2 and OP3 (MI = 34.031). Revised model 1: High modification index indicated high error covariance between Item HR21 and HR22 (MI = 21.815).

Legends: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

The output standardised model of HR practices for organisational performance is shown in Figure 5-10, and the unstandardised, as well as the standardised and

maximum likelihood parameter estimates are presented in Table 5-25. All the parameter estimates are statistically significant ($P < 0.001$) and substantively meaningful. Results show that HR practices have a positive significant impact on organisational performance ($\beta = 0.77$, $p < 0.001$). This result is consistent with previous studies that HR practices can influence organisational performance positively. It is also important to note that 59% of the variance associated with organisational performance is accounted for by HR practices.

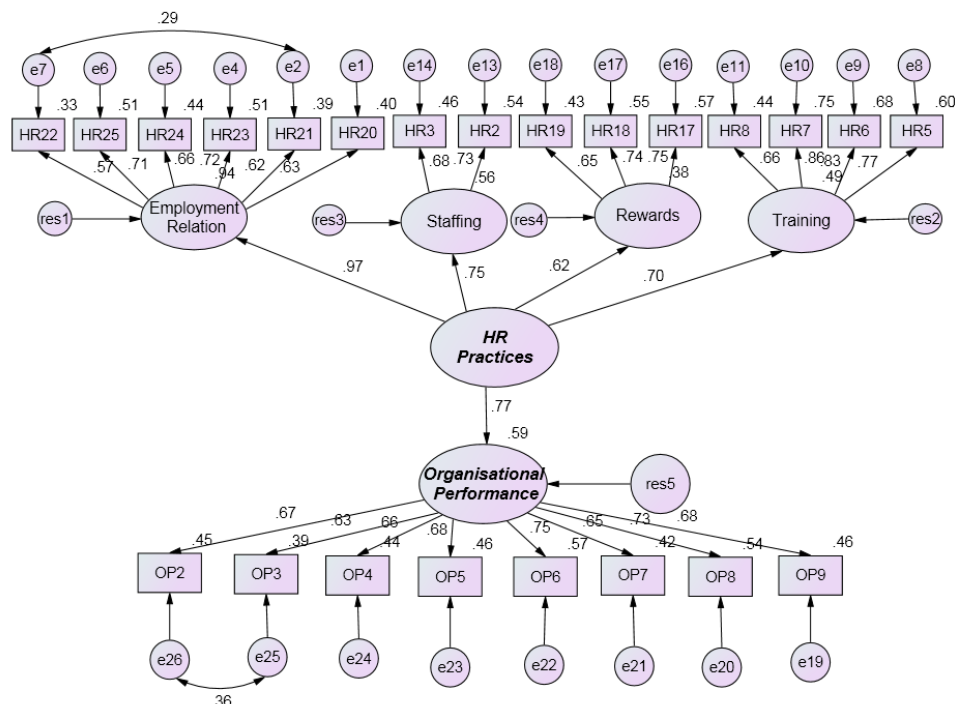


Figure 5- 10: Output standardised path diagram _ “HR practices – Organisational Performance” model

Table 5- 25: Regression weights for “HR practices – organisational performance” model

Regression Path			Standardised Estimate	Unstandardised Estimate	S.E.	C.R.	P-Value
Employment_	<---	HR Practices	0.970	0.720	0.055	13.106	***
Relation	<---	HR Practices	0.701	0.472	0.049	9.699	***
Training	<---	HR Practices	0.751	0.553	0.056	9.957	***
Staffing	<---	HR Practices	0.620	0.503	0.062	8.111	***
Rewards	<---	HR Practices	0.769	0.456	0.043	10.621	***
Organisational Performance	<---	HR Practices					

Note: S.E. = standard error of the covariance; C.R. = critical ratio;

P-value is significant at $P < 0.05$, ***, $P < 0.001$.

Step three: Mediating effects of In-role behaviour and OCBI

The mediator model of “HR practices – in-role behaviour and OCBI – organisational performance” is assessed firstly by goodness-of-fit indices and model modification following method in step one. Then, two changes are made in revised model 1 (covariance between errors of OP2 and OP3) and model 2 (covariance between errors of HR21 and HR22). The Third row in Table 5-26 shows the revised model 2’s goodness-of-fit indices, which indicate the marginally adequate (SRMR = 0.074 < 0.1; RMSEA = 0.063 < 0.1; CFI = 0.883 close to 0.9; IFI = 0.884 close to 0.9; TLI = 0.871 close to 0.9). Because this structural model is complicated, the marginally adequate goodness-of-fit statistics are considered as acceptable model fit to the data.

Table 5- 26: Goodness-of-fit indices for path analysis “HR practices – in-role behaviour and OCB - organisational performance” model

Model	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Original Model	959.53	396	2.423	.076	.066	.869	.870	.856
Revised model 1 by Connecting e26 and e27	922.89	395	2.336	.075	.064	.877	.879	.865
Revised model 2 by Connecting e2 and e7	898.99	394	2.282	.074	.063	.883	.884	.871
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Note. Original model: High modification index indicated high error covariance between Item OP2 and OP3 (MI = 33.987). Revised model 1: High modification index indicated high error covariance between Item HR21 and HR22 (MI = 22.231).

Legends: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

The output standardised model of “HR practices – in-role behaviour and OCBI – organisational performance” is shown in Figure 5-11, and the unstandardised, as well as the standardised and maximum likelihood parameter estimates are presented in Table 5-27. All the parameter estimates are statistically significant ($p < 0.001$) and substantively meaningful except for the path of “in-role behaviour – organisational performance ($p = 0.366$)” and “OCB – organisational performance ($p = 0.236$)”. In this model, HR practices have a positive significant impact on organisational performance ($\beta = 0.73$, $p < 0.001$). HR practices have a positive significant impact on in-role behaviour ($\beta = 0.29$, $p < 0.001$) and OCBI ($\beta = 0.48$, $p < 0.001$). But the relationship between in-role behaviour and organisational performance is insignificant ($\beta = 0.05$, $p = 0.366$). Similarly, the relationship between OCBI and organisational performance is insignificant ($\beta = 0.07$, $p = 0.236$). It is also important to note that 61% of the variance associated with organisational performance is accounted for by

HR practices, in-role behaviour and OCBI. The simplified Figure 5-11 is depicted in Figure 5-12.

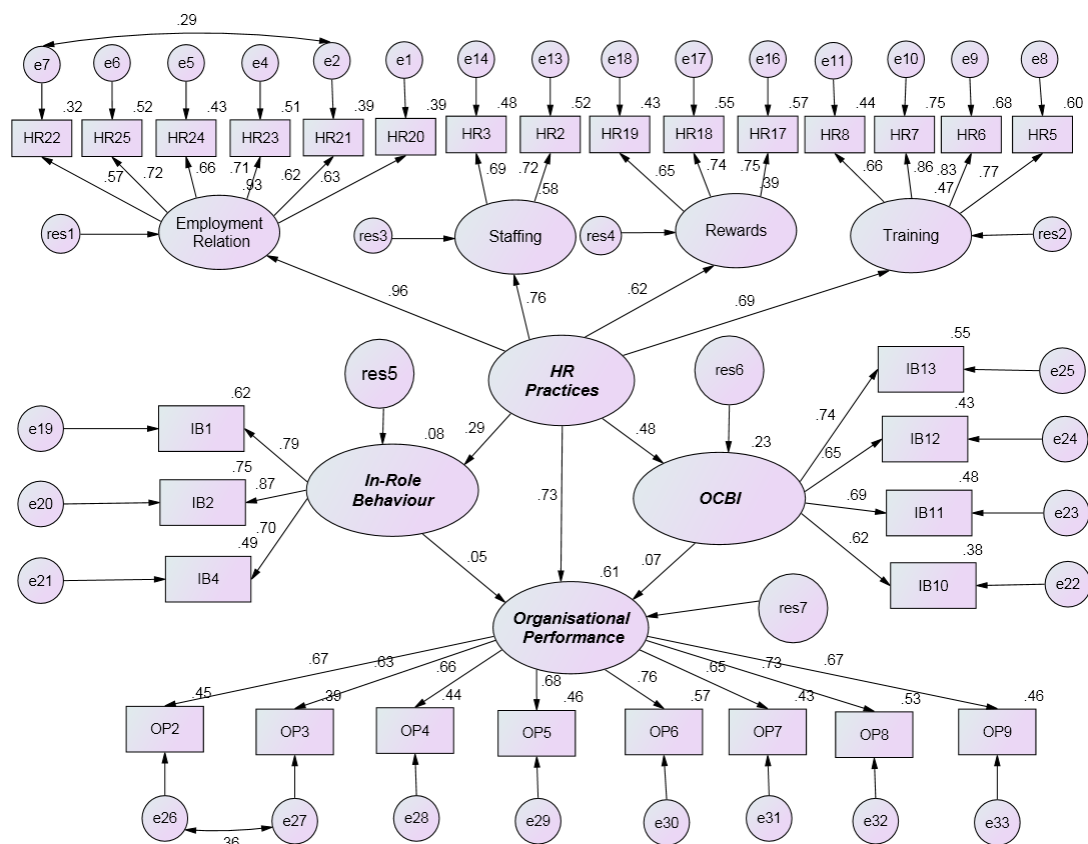


Figure 5- 11: Output standardised path diagram _ “HR practices –in-role behaviour and OCBI - organisational performance” model

Table 5- 27: Regression weights for “HR practices –in-role behaviour and OCBI - organisational performance” model

Regression Path			Standardised Estimate	Unstandardised Estimate	S.E.	C.R.	P
In-Role Behaviour	<---	HR Practices	0.288	0.163	0.038	4.309	***
OCBI	<---	HR Practices	0.478	0.297	0.044	6.817	***
Employment Relation	<---	HR Practices	0.962	0.723	0.054	13.267	***
Training	<---	HR Practices	0.688	0.464	0.048	9.573	***
Staffing	<---	HR Practices	0.764	0.553	0.055	9.965	***
Rewards	<---	HR Practices	0.621	0.505	0.062	8.136	***
Organisational Performance	<---	In-Role Behaviour	0.047	0.048	0.054	0.904	0.366
Organisational Performance	<---	OCBI	0.073	0.07	0.059	1.185	0.236
Organisational Performance	<---	HR Practices	0.729	0.429	0.047	9.091	***

Note: S.E. = standard error of the covariance; C.R. = critical ratio;
P-value is significant at P<0.05, ***, P<0.001.

Compared the regression coefficients between HR practices and organisational performance in step two ($\beta = 0.77$, $p < 0.001$) with step three ($\beta = 0.73$, $p < 0.001$), there is no significant difference of the regression coefficients between the two structural equations. And the insignificant coefficient between in-role behaviour and organisational performance ($\beta = 0.05$, $p = 0.366$) and between OCBI and organisational performance ($\beta = 0.07$, $p = 0.236$) indicate that individual behaviour cannot improve organisational performance directly and significantly. Hence, the mediating effects of in-role behaviour and OCBI are not found on the relationship between HR practices and organisational performance. H1-a is partially supported that HR practices can affect in-role behaviour and OCBI significantly.

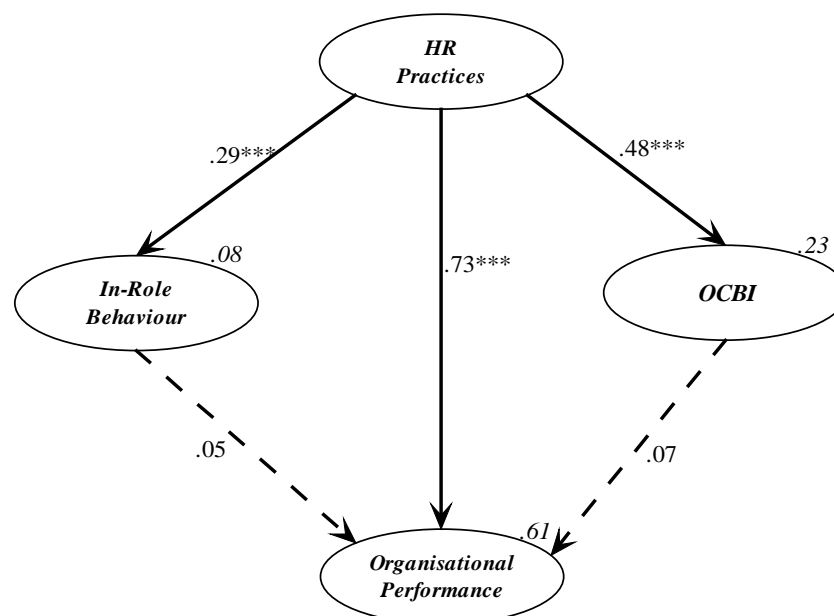


Figure 5- 12: Simplified path diagram of “HR practices –in-role behaviour and OCBI - organisational performance” model.

Note: the solid and dashed lines represent significant and insignificant paths respectively;
***, $p < 0.001$

5.5.2 H1-b: The mediating effects of organisational learning on the relationship between HR practices and organisational performance

Based on resource-based view and knowledge-based view, the employment of human resource management improves organizational learning, which increases organisational capability and, in turn, improves organizational performance. So, the

H1-b is postulated and the mediator model is tested in three steps with the results shown in Figure 5-14.

Step One: HR practices affect organisational learning

The structural equation model of “HR practices – organisational learning” is developed by the maximum likelihood estimation method in Amos 18.0. The model fit is assessed by goodness-of-fit indices, shown in Table 5-28. Selected multiple goodness-of-fit statistics in Table 5-28 show the model fits the data well (SRMR = 0.055 < 0.1; RMSEA = 0.064 < 0.1; CFI = 0.904 > 0.9; IFI = 0.905 > 0.9; TLI = 0.894 close to 0.9).

Table 5- 28: Goodness-of-fit indices for “HR practices _ organisational learning” model

	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Structural model	682.78	294	2.322	.055	.064	.904	.905	.894
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Legend: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

The output standardised model of HR practices for organisational learning is shown in Figure 5-13, and the unstandardised, as well as the standardised and maximum likelihood parameter estimates are presented in Table 5-29. All the parameter estimates are statistically significant ($P < 0.001$) and substantively meaningful. Results show that HR practices have a positive significant impact on organisational learning ($\beta = 0.94$, $p < 0.001$). It is also important to note that 88% of the variance associated with organisational learning is accounted for by HR practices.

Table 5- 29: Regression weights for “HR practices – organisational learning” model

Regression Path			Standardised Estimate	Unstandardised Estimate	S.E.	C.R.	P-Value
Employment Relation	<---	HR Practices	0.969	0.693	0.053	13.011	***
Training	<---	HR Practices	0.722	0.49	0.048	10.173	***
Staffing	<---	HR Practices	0.723	0.537	0.054	9.915	***
Rewards	<---	HR Practices	0.619	0.501	0.061	8.243	***
Organisational Learning	<---	HR Practices	0.937	0.665	0.061	10.909	***

Note: S.E. = standard error of the covariance; C.R. = critical ratio;
P-value is significant at $P < 0.05$, ***, $P < 0.001$.

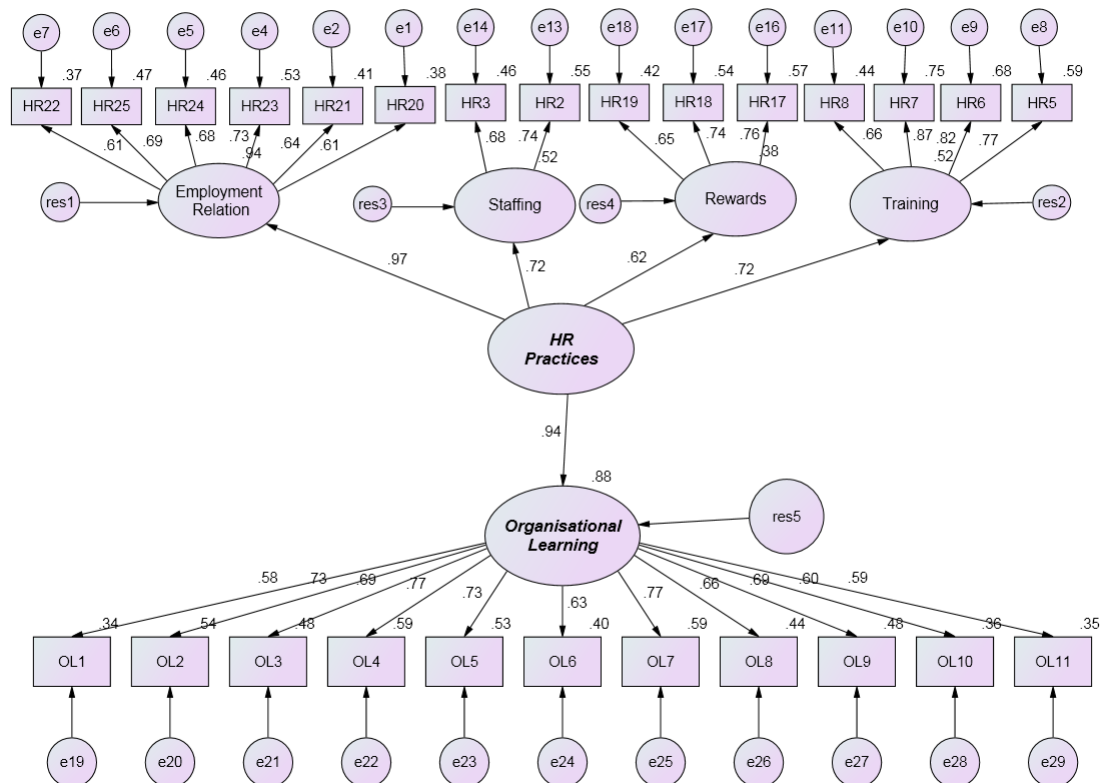


Figure 5- 13: Output standardised path diagram _ “HR practices – organisational learning” model

Step Two: HR practices affect organisational performance

Step two in this section is the same as step two in section 5.5.1. The results show that HR practices have a positive significant impact on organisational performance ($\beta = 0.77$, $p < 0.001$), and 59% of the variance associated with organisational performance is accounted for by HR practices, refer to Figure 5-10.

Step Three: mediating effects of organisational learning

The mediator model of “HR practices –organisational learning– organisational performance” is assessed firstly by goodness-of-fit indices and model modification following the method in step one of section 5.5.1. Then, three changes are made respectively, i.e., revised model 1(covariance between errors of OP2 and OP3), revised model 2 (covariance between errors of HR21 and HR22), and revised model 3

(covariance between errors of OL4 and OL5). The fourth row in Table 5-30 shows the revised model 3's multiple goodness-of-fit indices, which indicate the acceptable model fit to the data (SRMR = 0.057 < 0.1; RMSEA = 0.060 < 0.1; CFI = 0.890 close to 0.9; IFI = 0.891 close to 0.9; TLI = 0.880 close to 0.9).

Table 5- 30: Goodness-of-fit indices for path analysis “HR practices – organisational learning - organisational performance” model

Model	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Original Model	1205.7	520	2.319	.060	.064	.876	.877	.867
Revised model 1 by Connecting e30 and e31	1169.4	519	2.253	.058	.062	.883	.884	.873
Revised model 2 by Connecting e2 and e7	1144.3	518	2.209	.058	.061	.887	.888	.878
Revised model 3 by Connecting e22 and e23	1128.2	517	2.183	.057	.060	.890	.891	.880
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Note. Original model: High modification index indicated high error covariance between Item OP2 and OP3 (MI = 33.751). Revised model 1: High modification index indicated high error covariance between Item HR21 and HR22 (MI = 23.874). Revised model 2: High modification index indicated high error covariance between Item OL4 and OL5 (MI = 15.057).

Legends: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

The output standardised model of “HR practices – organisational learning – organisational performance” is shown in Figure 5-14, and the unstandardised, as well as the standardised and maximum likelihood parameter estimates are presented in Table 5-31. All the parameter estimates are statistically significant ($p < 0.05$) and substantively meaningful except for the path of “HR practices – organisational performance ($p = 0.308$)”. In this model, HR practices have a positive significant impact on organisational learning ($\beta = 0.95$, $p < 0.001$). And organisational learning have a positive significant impact on organisational performance ($\beta = 0.53$, $p < 0.05$). But the relationship between HR practices and organisational performance in this model is insignificant ($\beta = 0.26$, $p = 0.308$). And 62% of the variance associated with organisational performance is accounted for by HR practices, and organisational learning. The simplified Figure 5-14 is depicted in Figure 5-15.

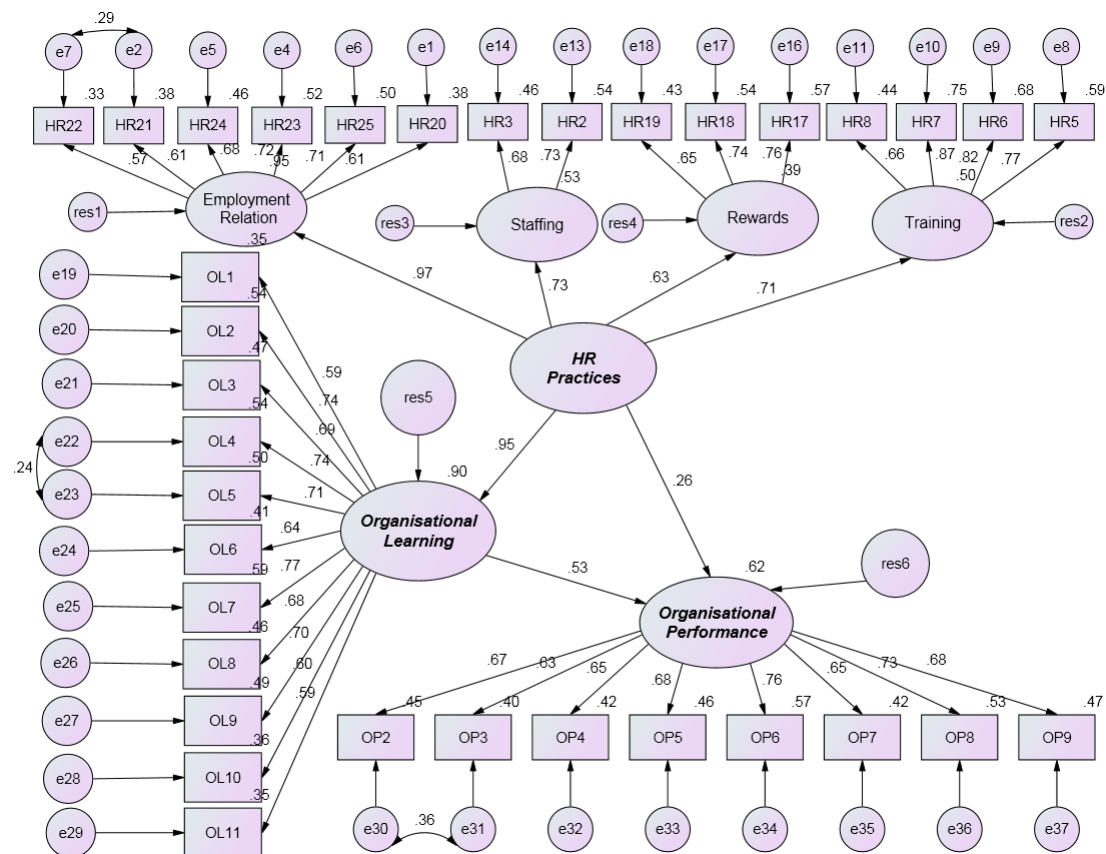


Figure 5- 14: Output standardised path diagram _ “HR practices – organisational learning – organisational performance” model

Table 5- 31: Regression weights for “HR practices – organisational learning – organisational performance” model

Regression Path			Standardised Estimate	Unstandardised Estimate	S.E.	C.R.	P
Organisational Learning	<---	HR Practices	0.947	0.673	0.061	10.992	***
Employment Relation	<---	HR Practices	0.974	0.591	0.052	11.411	***
Training	<---	HR Practices	0.708	0.479	0.048	10.023	***
Staffing	<---	HR Practices	0.727	0.535	0.054	9.9	***
Rewards	<---	HR Practices	0.627	0.51	0.061	8.379	***
Organisational Performance	<---	Organisational Learning	0.531	0.446	0.219	2.037	0.042
Organisational Performance	<---	HR Practices	0.264	0.157	0.154	1.02	0.308

Note: S.E. = standard error of the covariance; C.R. = critical ratio;
P-value is significant at $P < 0.05$, ***, $P < 0.001$.

The regression coefficients between HR practices and organisational performance in step two ($\beta = 0.77$, $p < 0.001$) is no longer significant in step three ($\beta = 0.26$, $p = 0.308$) when controlling for organisational learning, refer to Fig. 5-15. And the significant regression coefficient exist in path “HR practices – organisational learning

($\beta = 0.95$, $p < 0.001$)” and “organisational learning – organisational performance ($\beta = 0.53$, $p < 0.05$)”. According to Baron and Kenny (1986), a significant reduction demonstrates that organisational learning, as a mediating variable, is indeed potent when HR practices influence organisational performance. Hence, H1-b is supported that HR practices enhance organisational performance through their positive influences on organisational learning.

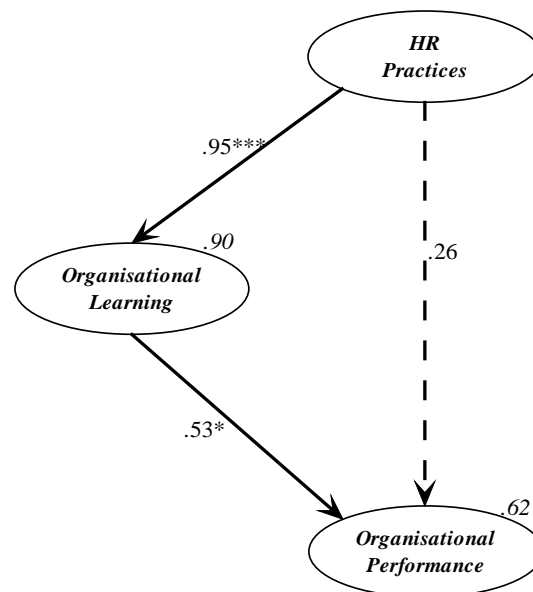


Figure 5- 15: Simplified path diagram of “HR practices –organisational learning - organisational performance” model.

Note: ***, $p < 0.001$; *, $P < 0.05$;

The solid and dashed lines represent significant and insignificant paths respectively.

5.6 Discussion and findings of quantitative research

5.6.1 The application of measurement scales

In the context of Chinese construction SOEs, it is necessary to test construct validity to develop valid measurement scales in quantitative studies (Tsui, 2006). First, ‘translation/back-translation’ technique is used to ensure the measurement quality in Chinese context (Behling and Law, 2002), i.e. Chinese scales are equivalence relative to the English ones in terms of semantic, conceptual, and normative. Second, except for the accurate translation, in order to ensure the scales are meaningful in the context of Chinese construction SOEs, two academic researchers in Chinese universities with

an average of twenty years industry-based experience and two Chinese industry experts who work in construction companies for over twenty years, are consulted. Third, the scales validity are assessed statistically by factor analysis in a large sample (sample size of this study is 326).

HR practices

Six factors of HR practices are extracted by exploratory factor analysis in Table 5-2, which is slightly different from the original Sun, et al.'s (2007) scale that uncovers eight factors in the context of China's hotels. In this study, the factor "employment relation" is identified as a unique factor (which includes the two factors of job description and participation in Sun, et al.' (2007) scale), and consistent with Bamberger and Meshoulam's (2000) theoretical configuration of high-performance HR practices. The loading values of two observed items on "job security" are negative and Cronbach's alpha reliability coefficient is very low (0.304) which is consistent with Sun, et al.' (2007) job security' factor reliability ($\alpha = 0.55 < 0.70$), so both tests demonstrate the two observed items are not reliable measures of job security in China's context; hence, future efforts are required to search for "emic" indicators unique to China. The cronbach alpha reliability coefficient is low (0.570) for mobility, the possible reason is that two of three observed items are reverse-coded, which may not be suitable for Chinese respondents. So, the indicators to measure job security in China's context also need to be developed in future studies.

Then, four factors (i.e. employment relation, training, staffing, and rewards) are sustained. The confirmatory factor analysis of first-order HR practices identifies four factors with model chi-square of 163.71 (d.f. = 84, SRMR = 0.063 < 0.1, RMSEA = 0.077 < 0.1; CFI = 0.908 > 0.9; IFI = 0.91 > 0.9; ILI = 0.89 close to 0.9), refer to Table 5-3. The high correlation and covariance between the four factors at significant level ($p < 0.05$) in Table 5-6 indicate the existence of a higher level order construct, i.e. HR practices. The second-order HR practices measurement scale has desirable model-to-data fit shown in Table 5-7 ($\chi^2 = 249.63$, d.f. = 86, SRMR = 0.058 < 0.1, RMSEA = 0.077 < 0.1; CFI = 0.918 > 0.9; IFI = 0.919 > 0.9; ILI = 0.900 \geq 0.9). The results demonstrate that the observed items are reasonable measures of the respective HR factors (see Figure 5-3).

Organisational Learning

The cronbach alpha reliability coefficient for organisational learning ($0.901 > 0.7$) confirms the internal consistency among the observed items. The confirmatory factor analysis in Table 5-10 identifies that one factor can underlie the eleven observed items with very good model-to-data fit shown in Table 5-9 ($\chi^2 = 117.89$, d.f. = 44, SRMR = 0.042 < 0.1, RMSEA = 0.072 < 0.1; CFI = 0.953 > 0.9; IFI = 0.953 > 0.9; ILI = 0.941 > 0.9).

The most commonly adopted learning practices in Chinese construction companies is “continuous individual learning” (highest mean score), which is consistent with Kululanga, et al.’s (2002) investigation of organisational learning in UK construction contractors. Chinese construction SOEs, regarding organisational learning behaviour, lack of internal improvement schemes (mean score of OL6 = 2.77 < 3.0 in Table 5-8), e.g. investigating new construction methods or building materials within the firm or by arrangement with others, and experts directions in construction fields (mean score of OL11 = 2.87 < 3.0 in Table 5-8). The internal improvement practice relates to construction innovation, e.g. new construction methods or building materials. The lowest mean score in the internal improvement practice indicate that construction innovation in Chinese construction SOEs is at low level and needs to be emphasized for future development.

Organisational performance

The reliability of organisational performance measurement scale is satisfied with high cronbach alpha reliability coefficient ($0.890 > 0.7$), which is consistent with Katou and Budhwar’s (2008) result (cronbach alpha = 0.92). However, the low correlation coefficients (< 0.4 in Table 5-11) between “revenue growth” and six other observed items, indicate that “revenue growth” is not internally consistent with other observed variables and needs to be deleted to improve the scale reliability. The high correlation coefficient (0.637, $p < 0.01$ in Table 5-11) between “client’s satisfaction” and “construction quality” is consistent with the high error covariance between the two items (modification index = 53.511 in Table 5-12), which means that the Chinese client’s satisfaction of construction project depends more on its quality. The validity of organisational performance measurement scale (deleting “revenue growth” and “construction quality”) is assessed by confirmatory factor analysis, which shows

acceptable goodness-of-fit indices ($\chi^2 = 76.72$, d.f. = 20, SRMR = 0.043 < 0.1, RMSEA = 0.093 < 0.1; CFI = 0.946 > 0.9; IFI = 0.946 > 0.9; ILI = 0.924 > 0.9 in Table 5-12). Confirmatory factor analysis result also demonstrates that the factor label of “organisational performance” can explain the eight observed items.

Employee’s individual behaviour

Within the seven items to measure individual in-role behaviour, two items (i.e. IB3 and IB7) are discarded because of their extreme non-normality problem of data distribution to satisfy assumption of maximum-likelihood estimation method shown in Appendix IV-2. As shown in Table 5-14, another two items are deleted because the item-total correlation coefficients for IB5 (0.102) and IB6 (0.006) are lower than 0.5, which mean poor internal consistency between the two items and other measure items. So, only three items are left to measure in-role behaviour, including adequately completing assigned duties (IB1); fulfilling responsibilities specified in job description (IB2); meeting formal performance requirements of the job (IB4). In Williams and Anderson’s (1991) original scale, the cronbach alpha reliability coefficient for in-role behaviour is 0.91. Thus, future efforts to develop more reliable in-role behaviour scale in Chinese context should include more observed indicators unique to local context (i.e. emic styles) combined with the existing scale in Western literature (i.e. etic style) (Ding, 1996; Farh, et al., 1997).

Regarding OCBO with original seven observed items, six items are discarded because of either non-normal data distribution or low item-total and inter-item correlation coefficients. But the cronbach alpha reliability coefficient for OCBO in Williams and Anderson’s (1991) original scale is 0.75. The factor OCBO is moved from the subsequent structural model because of low reliability. One of the possible reasons of non-normal data distribution is the reverse-coded question items, which are not suitable for Chinese respondents. The possible reason of low reliability (e.g. low item-total and inter-item correlation coefficients) is the Chinese employees’ different perception of OCBO dimension caused by Chinese unique cultural and social context, which is consistent with Farh, et al.’s (2004) investigation of OCB in China. For example, Farh, et al.’s (2004) have not found sportsmanship (e.g. a willingness to tolerate the inevitable inconvenience) to manifest OCBO in their Chinese sample.

The cronbach alpha reliability coefficient for OCBI ($0.766 > 0.7$) confirms the internal consistency among the four observed items although Williams and Anderson's (1991) original scale of OCBI has higher reliability (cronbach $\alpha = 0.88$). The confirmatory factor analysis identifies that one factor (i.e. OCBI) can underlie the four observed items with very good model-to-data fit ($\chi^2 = 8.493$, d.f. = 2, SRMR = $0.027 < 0.1$, RMSEA = $0.1 < 0.1$; CFI = $0.98 > 0.9$; IFI = $0.98 > 0.9$; ILI = $0.94 \geq 0.9$ in Table 5-20).

Perception of OCB varies across cultural boundaries. Chinese are very conscious of group harmony and face saving (Kirkbride et al, 1991), so avoiding conflict and keeping interpersonal harmony are very important for Chinese organisational citizenship behaviour in the work environment. For example, Farh, et al.'s (2004) found five extra OCB dimensions in Chinese society: self-training, social welfare participation, protecting and saving company resources, keeping the workplace clean, and interpersonal harmony. So, future research regarding OCB should go beyond OCBI and OCBO dimensions and investigate unique indicators for specific society culture. Hence, efforts are required to establish an operational scale for OCB including multiple indicators with acceptable reliability and validity in the Chinese context.

5.6.2 Positive effects of HR practices on individual behaviours

Based on Baron and Kenny's (1986) approach to test Hypothesis 1-a, i.e. individual behaviour as mediator on the relationship between HR practices and organisational performance, regression results fail to support the mediating effect of individual behaviour (refer to Fig. 5-12), as found in Wright and McMahan's (1992) theoretical model. One of the possible reasons is that although the constructs are measured by the respondents' perception at individual level, the different nature of construct level may affect the statistical results, i.e. HR practices and organisational performance belong to organisational level, and individual behaviour belongs to individual level. Future study should collect HR practices and performance data from firm level, and individual behaviour data from individual level, and then aggregate individual behaviour within one company to the organisational level (Klein and Kozlowski,

2000; Koys, 2001). For example, Sun, et al. (2007) aggregate service-oriented OCB data to organisational level by calculating within-group agreement statistics and intra-class correlation coefficients, and find that service-oriented OCB partially mediated the relationships between high-performance HR practices and organisational performance indicators of turnover and productivity in China's hotels. Complexity of the internal elements interacting within one organisation to affect organisational performance (Jackson and Schuler, 1995), and personal factors (Van Dyne, et al., 1994) and task characteristics (Podsakoff, et al., 2000) to affect individual behaviour, may be another possible reason of failure to test the mediating effect of individual behaviour statistically in such a simple structural equation model. Hence, it is necessary to look for the internal factors and mechanisms through which HR practices affect individual behaviour and individual behaviour contribute to organisational performance. Thus, qualitative method is adopted in Chapter 6 to investigate these cause-effect relationships. The third possible reason is that individual behaviour may only contribute to some of the indicators of organisational performance, for example, Koys (2001) finds that OCB has an impact on profitability, but not on customer satisfaction in the service sector.

The results in Table 5-23, however, indeed show that HR practices positively affect individual behaviour, including in-role behaviour ($\beta = 0.29$, $p < 0.001$) and OCBI ($\beta = 0.48$, $p < 0.001$). The findings are consistent with Zhang, et al.'s (2008) results that high-performance HR practices have a positive impact on OCB ($\beta = 0.33$, $p < 0.05$). In Zhang, et al.'s (2008) study, the measurement of HR practices is originally developed by Snell and Dean (1992) and Delery and Doty (1996), including staffing, training, internal mobility, employment security, job description, result-oriented appraisal, incentive reward and participation); and the measurement of OCB is originally developed by Podsakoff, et al. (1990), including helping, courtesy, sportsmanship, civic virtue and conscientiousness.

Interestingly, the effects of HR practices (i.e. job design, participation, training, staffing, and rewards) on OCBI is nearly twice on individual behaviour ($\beta = 0.48$ vs 0.29 in Table 5-23), which means that in Chinese construction SOEs, HR practice can affect and arouse more employees' extra-role behaviour than in-role behaviour. Extra-role behaviours (also called contextual performance) contribute to develop

organisational, social and psychological climate in which in-role behaviours must perform (Borman and Motowidlo, 1993). So, HR practices can affect more on extra-role behaviour, which then contribute to the social and psychological climate. Comparing the variable's variance explained, 23% of the variance associated with OCBI is accounted for by HR practices, but only 8% of the variance associated with in-role behaviour is accounted for by HR practices. So, except for the effects of HR practices, employee's OCBI is also affected by other factors (Van Dyne, et al., 1994, e.g. personality, perceptions of the motivating potential of employee jobs, organisational tenure or hierarchical job level); 92% of variance associated with individual in-role behaviour is explained by other factors (Motowidlo, et al., 1997), e.g. individual task skill, knowledge and work habit, and cognitive ability. The potential factors which affect individual behaviour will be investigated further in Chapter 6 by inductive method.

5.6.3 Positive effects of HR practices on organisational performance

Results show that HR practices have a positive significant impact on organisational performance ($\beta = 0.77$, $p < 0.001$). While there have been different scales adopted to measure HR practices and organisational performance (Huselid, 1995; Way, 2002; Guest, et al., 2003; Tseng and Lee, 2009), the findings of the analyses and the structural equation models in this study are consistent with the general consensus in the Western context that HR practices positively affect performance. HR practices in this study include employment (i.e. job description and participation), staffing, rewards, and training, which can be named as “core practices” of HR management; and these HR practices affect organisational performance including financial performance (i.e. profit growth), market share, firm objective achievement, satisfaction of clients and employees, and construction innovation. The findings regarding the effects of HR practices on performance are also consistent with the research in China's context, such as, Akhtar, et al.'s (2008) study in a sample of 465 Chinese enterprises, Ngo, et al.'s (2008) study in a sample of 600 Chinese firms.

The regression results in the structural equation model show that 59% of the variance associated with organisational performance is accounted for by HR practices, which

indicate that organisational performance is also affected by other factors. This is consistent with the theoretical framework in Chapter 3 that there are environmental factors and internal elements (e.g. organisational structure, strategy, and technology) influencing organisational performance.

To probe the black box of the relationship between HR practices and organisational performance, the mediating effect of organisational learning is investigated and statistically supported, which is discussed in the next section.

5.6.4 The mediating effect of organisational learning

Hypothesis 1-b is supported based on Baron and Kenny's (1986) mediator testing approach, i.e. HR practices enhance organisational performance through their positive influences on organisational learning, refer to Fig. 5-15. In the mediating model, HR practices (staffing, training, rewards, job description and participant) positively affect organisational learning ($\beta = 0.95$, $p < 0.001$), and organisational learning positively affect performance ($\beta = 0.53$, $p < 0.05$), but the relationship between HR practices and organisational performance becomes insignificant ($\beta = 0.26$, $p = 0.31$) compared with the regression coefficient of direct relationship ($\beta = 0.77$, $p < 0.001$).

There is no empirical research to investigate the mediating effect of organisational learning between the relationship of HR practices and performance. Different construct dimensions and measurement scales have been adopted by researchers. The findings in this study are consistent with Chen and Huang's (2009) results that strategic HR practices (staffing, training, participation, performance appraisal and compensation) positively affect knowledge management capability (knowledge acquisition, sharing and application) at $p < 0.01$ significant level, and knowledge management capability positively affect performance of administrative innovation and technical innovation at $p < 0.01$ significant level. Similarly, Collins and Smith's (2006) findings from 136 high-technology companies show that HR practices facilitate knowledge exchange and combination among knowledge workers ($\beta = 0.48$, $p < 0.01$) which then enhance firm's revenue from new products ($\beta = 0.46$, $p < 0.01$) and services and one-year sales growth ($\beta = 0.43$, $p < 0.01$).

It is surprising to find that a large proportion (90%) of the variance associated with organisational learning in China's construction organisations is accounted for by HR practices, which is different from Lopez, et al.'s (2006) result that 56% of the variance associated with organisational learning (measured by knowledge acquisition, distribution, interpretation and organisational memory) is explained by HR practices (including staffing, training, compensation, and participation) in a sample of 195 Spanish companies. The result in this study emphasizes the importance of HR practices on organisational learning, and leaves few remaining effects of organisational learning to be explained by other potential factors suggested in literature. For example, Collins and Smith's (2006) find that HR practices affect knowledge exchange and combination through their effects on organisational social climates for trust, cooperation, and shared codes and language.

Prior studies rarely test the process and links to understand how HR management leads to organisational performance (Becker and Gerhart, 1996; Bowen and Ostroff, 2004). This study finds that HR practices indirectly improve performance through their effects on organisational learning. In Collins and Smith's (2006) studies, they initially explore the potential links as organisational social climate and knowledge exchange and combination. As they state: "researchers must explore mediating firm capabilities to fully understand the role of HR practices on firm performance (p.554)". Hypothesis 1 has tested that "HR practices enhance organisational performance through their influences on employees' behaviours and organisation learning". The cause-effect relationships between individual behaviour and organisational learning in order to understand the role of HR practices on organisational performance (i.e. Objective 3) are to be explored and discussed in Chapter 6.

5.7 Summary

At the individual level, Hypothesis 1-a is partially supported. It has failed to find the mediating effect of individual behaviour on the relationship between HR practices and organisational performance. However, HR practices certainly affect individual in-role

behaviour ($\beta = 0.29$, $p < 0.001$) and OCBI ($\beta = 0.48$, $p < 0.001$). The implication of this finding is that HR practices can enhance employees' skills, experience, capability, and motivate their attitude to perform more in-role and extra-role behaviours.

At the organisational level, the result confirms that HR practices (staffing, training, rewards, job description and participant) positively affect organisational performance ($\beta = 0.77$) at significant level $p < 0.001$ (financial performance (i.e. profit growth), market share, firm objective achievement, satisfaction of clients and employees, and construction innovation) in the context of Chinese construction SOEs, which is consistent with previous studies.

Furthermore, Hypothesis 1-b is supported, i.e., HR practices positively affect organisational learning ($\beta = 0.95$, $p < 0.001$), and organisational learning positively affect performance ($\beta = 0.53$, $p < 0.05$). The relationship between HR practices and organisational performance becomes insignificant ($\beta = 0.26$, $p = 0.31$) when the mediating effect of organisational learning is taken into account. So, HR practices can indirectly improve organisational performance through their effects on the mediator of organisational learning. The implication in practice is that when managers want to improve firm's competitiveness and performance, they need to motivate and enhance organisational learning by the employment of HR practices.

Although the quantitative study has established and supported the HR – Performance model to demonstrate the general relationships among the main constructs, the model cannot adequately capture the complexity and dynamism in the context of organisational settings. In order to understand the complex situation between HR practices, organisational learning, and individual behaviour in the Chinese construction SOEs, inductive research is required to answer the following questions in section 4.4, i.e. :

- (a) What are the internal relationships between organisational learning (in terms of individual learning and knowledge sharing) and individual behaviour (including in-role behaviour, OCBI and OCBO)?
- (b) How do HR practices (in terms of training and rewards) affect organisational learning (in terms of individual learning and knowledge sharing) and individual behaviour (including in-role behaviour, OCBI and OCBO)?

- (c) How do organisational learning (in terms of individual learning and knowledge sharing) and individual behaviour (including in-role behaviour, OCBI and OCBO) affect organisational performance?

Chapter 6 Qualitative Data Analysis – Stage Two

The stage two data analyses (refer to Fig. 4-4) aim: (1) to develop the conceptual causal relationships between main constructs (see HR practices in terms of training and rewards, organisational learning in terms of individual learning and knowledge sharing, in-role behaviour, OCBI, OCBO, and unit performance) using cognitive mapping method, which can cross validate the stage one quantitative findings; (2) to identify the directional causality between organisational learning and individual behaviour to achieve Objective 3 (refer to Fig. 4-3); (3) to identify the possible mediating variables which may affect the relationships among main constructs (see social capital, perceived organisational support, and co-worker productivity); and (4) to test the qualitative findings in the cognitive map using structural equation modelling method.

6.1 Interview data collection

Reflexivity in qualitative research

Because of the nature of qualitative research, the researcher cannot be totally separated from the knowledge being generated. The researcher should constantly take stock of his/her actions and role in the research process, i.e. active reflexivity (Mason, 1996). There are two types of reflexivity in the research process: personal reflexivity and epistemological reflexivity (Willig, 2001). According to Willig (2001: 10), “personal reflexivity involves reflecting upon the ways in which our own values, experiences, interests, beliefs, political commitment, wider aims in life and social identities have shaped the research. Epistemological reflexivity requires us to engage with questions such as: How has the research question defined and limited what can be ‘found’? How has the design of the study and the method of analysis ‘constructed’ the data and the findings?”. In this study, both types of reflexivity are necessary and so, involve self-scrutiny during the whole process of the study.

Sampling

Sampling is important for the credibility of any study involving a survey, because the choice of sample influences the findings of the study (Lopez-Gamero, et al., 2008). In the questionnaire survey, the snowball sampling method was adopted. Initially, 117 middle level staffs (as potential seeds) who work in Chinese construction organisations were selected from the personal contact list of the researcher and the list of one Chinese academic researcher; they are from various firms (regarding firm history, grade, location) with various personal characteristics (like age, work experience, job position and educational level). Then, 42 participants returned the questionnaire and were asked (as seeds) to recruit the similar level colleagues or friends in construction firms to fill the questionnaire. Finally 335 questionnaires were collected. In the interview survey, there are 8 respondents who agreed to be interviewed. Among the 8 respondents, four of them have participated the questionnaire survey and have been selected because they are the first four respondents who accepted the interview; the other four interviewees who did not participate the questionnaire survey were selected because they own the knowledge in the research area. This gave the researcher an opportunity to compare the difference of the interview answers between the two groups, whether the previous knowledge of quantitative research has influence on the respondent's answers. All the participants have over 5 years industry-based work experience, and are currently middle-level managers who fully understand the practices adopted by their companies. Their background information is summarized in Table 6-1. Regarding the ethical issues of interviewing, an ethical clearance checklist has been completed and approved by the Ethical Advisory Committee of Loughborough University before the interviews commencement. The qualitative data are collected by telephone interviews, which are recorded with the interviewees' permission.

At the beginning of the each interview, the research aim, purpose of the interview and clear research context were explained to the participants by the researcher, and the participants were consulted whether they had any questions about the interview. During the interview, the researcher fostered a friendly environment to encourage the participants to share their experiences in the areas under investigation. After the

interview, appreciation was expressed and the contact details were confirmed to make sure the participants could be contacted if there were any unclear points which emerged during the interview transcription.

Interview instrument developed in Section 4.4 (see Appendix III) is pre-tested with one academic colleague and two Chinese industry experts to make sure that each respondent understand the questions in the same way and the interview answers can be coded with minimum possibility of uncertainty (Silverman, 2006). To improve the reliability of the qualitative study, interviews are recorded and transcribed carefully using low-inference descriptors (Silverman, 2006). Validity of the qualitative research is achieved by the examination of multiple participants with different background information and the analysis of comparative findings (Lopez-Gamero, et al., 2008).

Table 6- 1: Profile of the participants selected in Chinese construction SOEs

Participants	Gender	Firm Location	Firm Grade	Personal Position	Work Experience
1	Male	Beijing	Premier Grade	Project Site Manager	7 years
2	Female	Shanghai	First Grade	Deputy Department Head	12 years
3	Female	Beijing	First Grade	Commercial Manager	8 years
4	Male	Beijing	Premier Grade	Project Manager	7 years
5	Female	Tianjin	First Grade	Project Manager	7 years
6	Female	Beijing	First Grade	Commercial Manager	5 years
7	Male	Shenzhen	Premier Grade	Deputy Department Head	7 years
8	Male	Guangzhou	Premier Grade	Project Site Manager	7 years

6.2 Interview data analysis

As discussed in section 4.6, cognitive map, developed by causal mapping technique, is adopted to identify the meaningful concepts related to the main constructs (i.e. content analysis), and to reveal the cause-effect relationships between organisational learning and individual behaviour to understand the whole problem domain (i.e. procedural mapping). According to Nelson, et al.'s (2000) review of causal mapping methodology, three facets are identified and discussed in subsequent sub-sections:

- Identify *the causal statements* which imply explicit cause-effect relationships from the transcribed interview of different respondents against the same interview question;

- Identify causes and effects from the causal statements, code the meaningful *concepts*, and identify the *construct*, if necessary, relating to the meaningful concepts based on the related literature;
- Construct the *causal map* based on the causal statements, coded concept and construct, and related literature.

6.2.1 The conceptual causal relationships between HR practice (Training), organisational learning (in terms of individual learning and knowledge sharing) and individual behaviour

Before revealing the inter mechanism between training, organisational learning and individual behaviour, the factors which influence the training program design (i.e. organisational culture and training goal) are discussed first.

Organisational culture

The training program arrangement and design from the 8 companies are reported as follows. Respondent 1 noted that: *“my company has regular training lecture and workshop, at least once per month, e.g. the characteristics of new contract document, the claim case analysis; most of our training activities relate to specific case occurred in my company, and the aim is to avoid similar problems in future”*.

Respondent 2 described that: *“at the beginning of each year, the company requests each department to propose its training requirement, and then the company integrates the proposals from various departments and then makes a final annual training plan”*.

Respondent 3 gave details information that: *“for the new recruits, my company arranges one-week orientation training for them to understand company’s history, strategy, rules, benefits, etc., the specific professional training will be arranged by the departments”*.

Differently, respondent 4 said that: *“my company does not have formal training plan, and there will be some training activity if a new project commences or new technology adopted”*.

Respondent 5 noted that: *“the company arranges new recruits to visit project site for two weeks; but I think it is lack of training with respect to the company development strategy and its changing structure over time”*. Respondent 6 and 7 reported similar training arrangement as respondent 3.

Respondent 8 emphasized that: *“for new technology and techniques, my company could arrange workshops and site visits to the successful projects; but I think we are lack of any systematic training plan”*.

Although the 8 respondents reported different training arrangement, the companies design the training events according to the firm’s rules, procedure, perception of importance of training activity, which manifest the organisation’s beliefs regarding training activity. Organisation’s beliefs refer to organisational culture, so “organisational culture” can be identified as one factor to influence training design. As Fiol and Lyles (1985) explain that: “an organisation’s culture manifests itself in the overriding ideologies and established patterns of behaviour. Thus, culture consists of the shared beliefs, the ideologies, and the norms that influence organisational action-taking (p.804)”. Hence, organisational culture (i.e. beliefs and norms) may affect managers when making training plan and designing the training program (i.e. organisational action-taking).

Training goals

Another factor that may affect the training program is “training goals”. For example, respondent 2 noted that: *“because my company is pushing the procurement type of ‘design and build’, the training activities regarding this procurement are increased, e.g. the contract management, project management; another strategy for my company is entering overseas market, the training activities about international policy are then arranged”*.

Respondent 6 described that: *“because my colleagues have different knowledge background (such as electrical, automotive, civil engineering) who do not have system learning experience about project management, which is required in current project procurement process, my company arranged project management training from last year”*.

Similarly, respondent 7 said that: *“generally speaking, each department firstly summarises the problems which occurred last year, and then the training activities are decided after department managers’ discussion aiming to solve the problems, e.g. the subjects for this year include project’s legal affairs, conflict management on project site, and contract management”*.

Respondent 8 provided more information that: *“in order to continually improve staff’s abilities and advance their professional certification levels, my company may provide opportunities for them to attend external training activities”*.

So, “training goals” can be abstracted from the transcript text. Training goals may facilitate managers’ decision on which training activities are required to achieve organisational strategy, to solve problems or to improve staffs’ professional competence. Training goals are set by need assessment from perspectives of organisation, task, person and demographics (Latham, 1988; Tannenbaum and Yukl, 1992).

After the training program is made, the participants are asked about the evaluation of training events, and the concept of “training content” is identified from the interview.

Training content

All the respondents mentioned in different ways, that the concept of “training content” is important for the effectiveness of training activity. For example, respondent 1 noted that: *“the choice of training topics can affect the effectiveness of training. In my company, my colleagues prefer the training embedded with practical case studies to those of theoretical content”*.

Furthermore, respondent 2 described that: *“the applicability of training depends on what the lecturer teaches and the way the lecturer delivers the material. In my experience, one training activity about contract negotiation by a negotiation expert was very successful because the content was very specific and the expert explained the material inductively and interestingly, so the feedback of audiences’ satisfaction achieved to 90% above”*.

Interestingly, respondent 3 noted that: *“our company provides various diversified training, e.g. 3-D design, project management, health and photography. The employees can attend any training activity if they’re interested.”*

Respondent 5 also stated the specific training regarding language for staff in overseas project. Respondent 8 noted one special training activity regarding new techniques and construction method during project procurement.

One condition of the effective training practice is that training content must be able to satisfy the training goals and attracts the employees’ interest. So, organisational culture and training goals may affect training design and training content, and the causal relationships between them are shown in Figure 6-1. Next, the possible effects of training are investigated in subsequent sections, i.e. individual knowledge, skills and abilities, and organisational social capital.

Individual knowledge, skill and ability

One direct effect after training activity for employees is the improvement of their knowledge, skill and abilities, which can be abstracted from the interview transcript. For example, respondent 1 noted that: *“the training workshops in my company usually talk about the problem-solving methods during project procurement, either relating to the general project or one specific project, so the workshops provide staff information and knowledge required in work, e.g. issues regarding arbitration”*.

Respondent 2 gave a detailed example: *“after the negotiation training course, I understand that I should never provide guarantee during the bargaining process with customers”*.

Respondent 3 also mentioned that she obtained useful knowledge through diversified training courses. The other respondents provided similar answer that the specific skills improved by related training program. One example from Respondent 8 is that:

“through site visit learning, I can obtain related information and knowledge about the construction method and techniques of the successful project”.

Individual knowledge, skill and abilities relate to individual learning, which is one dimension of organisational learning (Wang and Ahmed, 2003). According to the literature, two personal variables may also affect the improvement of employee's individual knowledge, i.e. self-efficiency and individual goal orientation.

Even though the employee's individual knowledge, skills and abilities have been improved through training, the application of the knowledge in job-related activities is important for the individual's job performance (refer to Figure 6-1).

Employees' job implementation

The concept of “employees' job implementation” when they apply the knowledge, skills and attitudes gained is another factor which may affect the effectiveness of training program. For example, respondent 2 described that: *“the understanding of the knowledge obtained from training is still not enough... the employees need to apply the knowledge to the actual job”.*

Similar answer was given by other respondents. But Respondent 1 noted that: *“one training experience is that we invite safety expert from another company to introduce the safety issues operated by his company's projects, but we did not adopt the methods the expert introduced in our daily job because the different characteristic and culture of each company. So this training only provided some information but did not direct the safety practice in our future projects”.* Respondent 1's description supports the notion that the employee's individual knowledge affect in-role behaviour through his/her job implementation (refer to Figure 6-1).

Thus, employees' application of the knowledge obtained during job implementation is related to improvement of individual's in-role behaviour.

Social capital

Except for individual knowledge enhancement, the effects of training include other concepts, for example, trust among colleagues, and shared language.

Respondent 1 noted that: *“one aim of training with respect to specific knowledge (e.g. the legal affairs, professional structural engineering) is to provide common knowledge related to specific area to improve the cooperation during problem-solving”*.

Furthermore, Respondent 2 described that: *“training provides opportunities to know colleagues from other departments, to understand their work after chatting with them, and even make friends, and the training environment is friendly”*.

Similarly, Respondent 3 explained that: *“after training, the relationship between me and colleagues is closer, which helps me cooperate and communicate with them easier during future work”*.

Regarding new recruit orientation training, Respondent 6 said: *“after recruit orientation training, the new staff knows each other, and they always communicate with each other to understand each other's job and related departments' work, so it is helpful for cooperation between each other in future work”*.

Furthermore, respondent 8 noted that: *“during the site visit to the successful projects, I established a friendly relationships with the project manager and senior engineer and learned their successful construction method. I also discussed with them the construction methods and techniques based on my experience”*.

The above transcript text mentions the concepts: cooperation, relationship, common language, easy communication, knowing each other, understanding colleague's job.

Conceptually, Putnam (1995) defines *social capital* as “features of social life – networks, norms, and trust – that enable participants to act together more effectively to pursue shared objectives.” In the perspective of organisational intellectual capital, Youndt and Snell (2004) define social capital as “an intermediary form of intellectual capital consisting of knowledge resources embedded within, available through, and derived from networks of relationships (p.339)”. Bolino, et al. (2002) point the importance of social capital as: “individual work together more effectively and efficiently when they know one another, understand one another, and trust and identify with one another (p.507)”.

Empirically, Onyx and Bullen (2000) discuss social capital in terms of participation in networks, reciprocity, trust, social norms, the commons, and social agency; they surveyed five Australian communities and identified three factors as participation in networks, social agency and trust.

Hence, comparing the concepts abstracted (i.e. cooperation, relationship, common language, easy communication, knowing each other, understanding colleague’s job) with the definitions of social capital, the components of construct “social capital” are identified. Training is helpful to develop organisational social capital, refer to Figure 6-1. The next section discusses the role of social capital in knowledge sharing among colleagues.

Knowledge sharing among colleagues

When the respondents are asked the factors which influence knowledge sharing between them and their colleagues, they mentioned “social capital” manifested by friendly relationship, cooperation, easy communication.

For example, respondent 2 said that: *“I know my colleagues well after training, and then during the cooperation when work overlaps, we share our experience and knowledge with each other, which results in the improvement of both my work productivity and my colleagues’ productivity”*.

Respondent 3 gave an example that: *“because I’m satisfied with my company’s working environment, which is helpful and friendly, I always communicate my ideas with my colleagues. Once I wrote a risk assessment report based on a case in my experience, and then presented and shared it with my colleagues in a department meeting, and this report will help my colleagues to solve similar problems in their future work”*.

On the contrary, respondent 5 described that: *“in my company, we lack internal communication between departments; I am working at the early stage of projects (i.e. project contract bidding) which actually is connected closely with the construction and evaluation stages, if they share their knowledge and feedback about the evaluation of the project, our department can provide bidding documents with more benefits for our company and avoid the problems which may occur during construction”*.

Based on the above transcript texts, causal relationships are simplified as: development of social capital (in terms of trust, cooperation, communication, and shared code and language) could enhance knowledge sharing among colleagues, which, then, improves employees’ in-role behaviour and co-worker productivity.

According to the causal statements mentioned above and the concept abstracted, the cognitive map of HR practice (training), organisational learning (in terms of knowledge sharing and individual learning) and individual in-role behaviour, is developed in Figure 6-1.

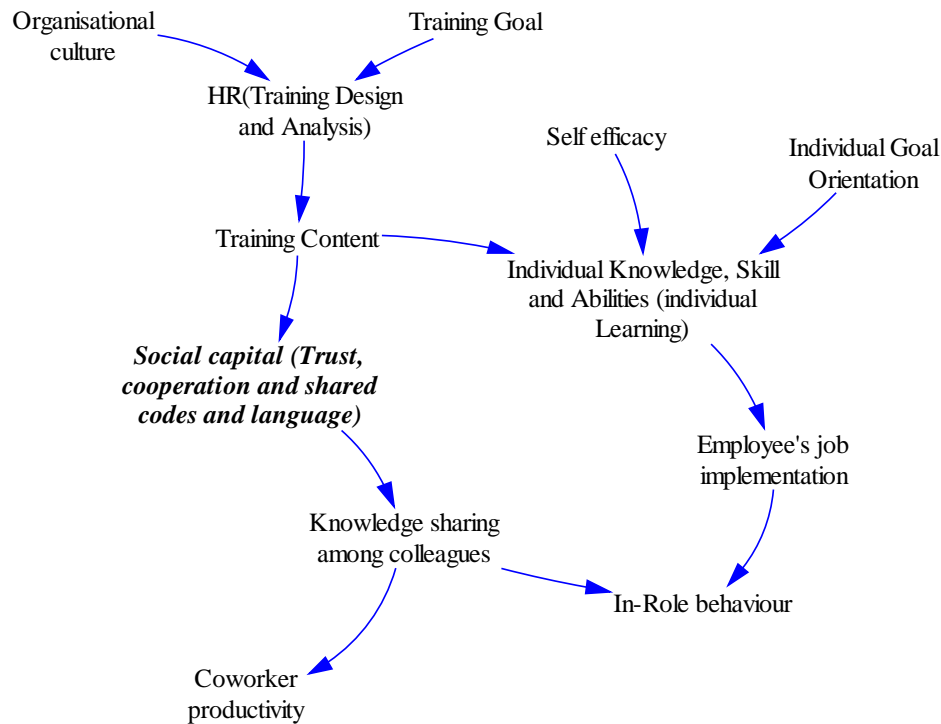


Figure 6- 1: Cognitive map of training, organisational learning, and employee's in-role behaviour

Notes: the variables underlined denote variables tested in Chapter 5 quantitative study; the italic variable denotes the mediating variable identified.

6.2.2 The conceptual causal relationships between HR practice (Rewards), individual behaviour, and organisational performance

The respondents are asked the following question:

- What are the effects of the reward practices your company provided to you?

According to respondents' answers, rewards practice can increase individual job satisfaction and retain qualified employees. Further, employees perceive organisational support based on the rewards provided (including intrinsic and extrinsic rewards).

Individual job satisfaction

Respondent 1 noted that: "*in my company, if the manager is satisfied with your job performance, he will increase your salary or give your promotion; and generally, if the company views you as a potentially successful project manager, the company will*

give you more work load and pressure to train you with required experience and knowledge. For me, I am satisfied with the company's arrangement, e.g. my first project experienced 30 months and I clearly understood every stage during operation. Then, I expected promotion after my first project, and now I'm project site manager and want to gain more experience to be more competitive in my career".

Respondent 2 described that: *"in my understanding, providing training opportunities is reward for me, which motivates me; I feel this is better than the company which only wants me to work harder. All my department colleagues expect this kind of opportunity. And I can feel the company recognizes me as promising staff with better career development. ... I will not quit the job unless I am misunderstood or not recognized any more by the company."*

Respondent 3 said that: *"the salary and bonus in my company can reflect the individual performance in last year, which is evaluated by the supervisor. Except for that, the excellent staff award and career promotion also reflect my company's recognition for my individual contribution in last year. I am happy to get the award and want to stay in the company. "*

Similarly, Respondent 4 described that: *"in my company, the rewards mainly refer to high salary and bonus, which depends on the individual performance and project performance. The amount of bonus reflects my contribution to the project and the company. I feel that the company trusts me and authorizes me to do my job."*

Respondent 7 noted that: *"my income relates to salary, bonus, and my performance evaluated by my manager. And of course, the higher income I get, the more satisfaction I have. At the same time, my company uses three areas to retain qualified staffs: the first one is providing career platform for qualified staff to perform; the second one is improving staff's commitment to company and letting staff feel the company's support; and the last one is high salary with bonus".*

Respondent 8 said that: *"all my company's efforts, including personal benefits, job promotions, career development, and training opportunity, are to improve the staff's satisfaction and loyalty, and let staff feel that the company treats you well and then*

the staff want to stay at the company. For example, about 4 years after you joined the company, the manager will plan your future career according your personal characteristics and professional fields (e.g. quantity surveyor, technical engineer, project management), and then train you to be an expert in that specific area”.

From above transcript texts, the causal statements can be identified and simplified as:

- (1) If the individual's performance (i.e. individual in-role behaviour) satisfies his/her supervisor, he/she will get proper rewards (including intrinsic and extrinsic).
- (2) The rewards provided by the company affect employee's job satisfaction.
- (3) If the employee's job satisfaction is achieved, the company is likely to retain the qualified employee.

Thus, the main concepts are supervisor's satisfaction with the employee, individual job satisfaction (i.e. employees' overall affect-laden attitude toward their job, Witt, 1991), and retaining qualified employees. The causal map relating to the above 3 causal statements is shown as Figure 6-2.

Based on the literature and interviews, justice may affect the individual job satisfaction, and individual personality may affect retention of the qualified employees. So, the concepts of justice and individual personality are added to Fig. 6-2.

According to the transcripts above in section 6.2.2, the company's recognition, trust, company's favourable treatment and support are perceived by the respondents to be the main effects of rewards.

Perceived organisational support

Perceived organisational support is defined by Eisenberger, et al. (1986) as: “the employees' global beliefs that the organization values their contribution and cares about their well-being”. As the company generally value employees' commitment and loyalty, the employees are also concern about the company's commitment to them. For example, Rhoades and Eisenberger (2002) explain the manifestation of perceived

organisational support as: “being valued by the organization can yield such benefits as approval and respect, pay and promotion, and access to information and other forms of aid needed to better carry out one’s job”.

So, the concepts abstracted above from the transcript texts (i.e. company’s recognition, trust, company’s factorable treatment and support) can be identified as the primary components of the construct “perceived organisational support”.

Rhoades and Eisenberger (2002) summarize the consequences of perceived organisational support to be: organisational affective commitment (Eisenberger, et al., 2001), job-related affect (including job satisfaction and positive mood, Witt, 1991), job involvement (O’Driscoll and Randall, 1999), employees’ performance (including in-role performance, OCBI and OCBO), strains (Cropanzano, et al., 1997), desire to remain with the organisation (Witt, 1991), and withdrawal behaviour (Wayne, et al. 1997).

According to the meta-analysis results of Rhoades and Eisenberger (2002), there is a minor relationship between perceived organisational support and employee’s in-role performance, a minor relationship between perceived organisational support and extra-role behaviours directed toward individuals (i.e. OCBI), and moderate relationship between perceived organisational support and extra-role behaviours directed toward the organisation (i.e. OCBO).

Moorman, et al. (1998) find that perceived organisational support mediates the relationship between procedural justice and four dimensions of OCB: interpersonal helping (i.e. helping co-workers), individual initiative (i.e. communication to co-workers), personal industry (i.e. performance of specific tasks beyond the duty), and loyalty boosterism (introduction of the organisational image to outsiders). According to Moorman, et al.’s (1998) results, perceived organisational support has significant effect on interpersonal helping ($\beta = 0.29$, $p < 0.01$), personal industry ($\beta = 0.19$, $p < 0.05$), and loyalty boosterism ($\beta = 0.32$, $p < 0.001$), but insignificant effect on individual initiative ($\beta = 0.10$, $p > 0.05$).

Similarly, Wayne, et al. (1997) find that perceived organisational support has significant effect on OCB ($\beta = 0.221$, $p < 0.01$), but insignificant effect on performance rating which relates to in-role behaviour ($\beta = 0.055$, $p > 0.05$). The measurement of OCB in this study is modified from Smith, et al.'s (1983) scale, and the sample items include: this employee helps others with their work when they have been absent even when he/she is not required to do so; this employee volunteers to do things not formally required by the job; this employee makes innovative suggestions to improve the overall quality of the department. Through meta analysis, Podsakoff, et al. (2000, p.528) also find that perceived organisational support positively relates to altruism (i.e. helping colleagues, $\beta = 0.31$, $p < 0.05$).

According to the findings of the literature above, perceived organisational support could motivate employees' extra-role behaviour, including OCBI and OCBO, and the causal relationships are depicted in Fig. 6-2.

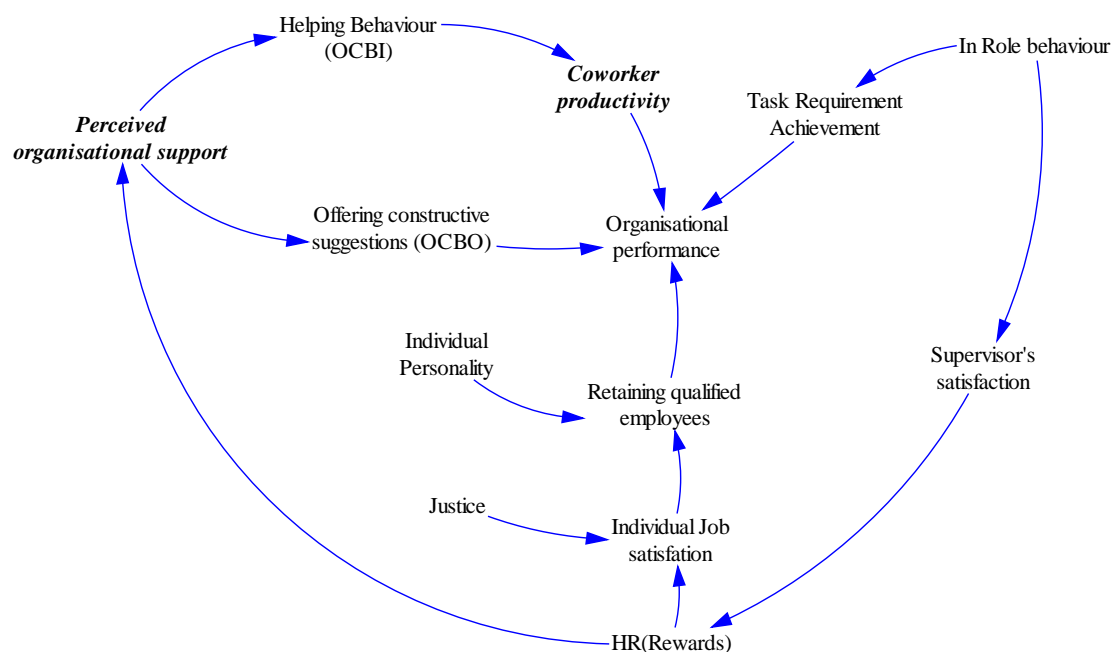


Figure 6- 2: Cognitive map of rewards, individual behaviour and organisational performance

Notes: the variables underlined denote variables tested in Chapter 5 quantitative study; the italic variable denotes the mediating variable.

The causal relationship between individual behaviour and organisational performance

The respondents are asked the following questions:

- When you have difficulties in fulfilling the responsibilities specified in your job description, how will you solve them?
- If you perform extra-role behaviour (like helping your colleagues, or providing suggestions for the project or the firm), in your opinion, what are the effects of such behaviours?
- How does your individual performance contribute to organisational performance?

It is identified from the respondents' answers that individual in-role behaviour contributes to organisational performance through the task requirement achievement. For example, the typical answer from Respondent 6 is: *"I think if I can achieve my job requirement, this can be my contribution to my company"*.

According to the respondents' answer, in order to achieve the in-role responsibility which they cannot complete by themselves; they generally look for help from their colleagues or friends. For example, Respondent 1 described that: *"when I am a new recruit in the job site, although we have pre-session training, if I still have problems in my work, I usually ask my colleagues to help me and teach me until I understand how to do it."* Thus, helping behaviour can improve co-worker productivity.

Furthermore, regarding the effects of helping behaviour (i.e. OCBI), the respondents' answers demonstrate that helping behaviour can assist colleagues to solve job-related problems, and then improve colleagues productivity (i.e. co-worker productivity). Regarding the effects of providing suggestions for the project or the firm (i.e. OCBO), the respondents, generally, said that it is helpful for managers to make decisions but the effects were difficult to measure.

So, the causal relationships between in-role behaviour, helping behaviour and offering suggestions for the project or the firm, and organisational performance are depicted in Fig. 6-2, including the mediating variables of co-worker productivity and task requirement achievement.

In sum, Section 6.2.1 has discussed the causal relationship between training, organisational learning (in terms of individual learning and knowledge sharing) and individual in-role behaviour; and Section 6.2.2 has discussed the causal relationship between rewards, individual behaviour (including in-role behaviour and OCB), and organisational performance. Next, Fig. 6-1 and Fig. 6-2 are combined because of common variables: in-role behaviour, and co-worker productivity.

6.2.3 The final cognitive map of HR (training), organisational learning, HR (Rewards), individual behaviour and organisational performance

Before the combination of Fig.6-1 and Fig. 6-2, the causal relationship between helping behaviour (i.e. OCBI) and social capital (in terms of trust, cooperation and shared codes and language) is discussed.

Interview answers to the question “if you perform extra-role behaviour (like helping your colleagues), in your opinion, what are the effects of such behaviours?” are exemplified. Respondent 1 said that: *“I think this is reciprocal, if I help my colleague, next time he will help as well when I need his help.”*

Respondent 3 noted that: *“once I helped my colleague, who hadn’t done it before, about claiming tax, then he completed the task successfully. After that, our relationship became closer”*.

Similarly, respondent 8 explained that: *“it is common that we face problems at the project site and cannot solve them by ourselves only. I always help my colleagues in contract management and project management, and as return, I think they are happy to help me as well when I have problems in work”*.

The respondents mention the results of helping their colleagues to be reciprocal helping and closer relationship. Reciprocal helping and closer relationship can be identified as manifestations of “social capital”.

Theoretically, Bolino, et al. (2002) propose that OCB plays an essential role in the development of organisational social capital, and emphasize that social capital is a consequence of OCB. They present a framework including the propositions that: OCB (in terms of social participation) will enhance structural social capital (through network ties, configuration of ties, and network appropriability); OCB (in terms of loyalty, obedience, functional participation, and social participation) will enhance relational social capital (through liking, trust, and identification among employees); OCB (in terms of advocacy participation and social participation) will enhance cognitive social capital (through shared language and narratives among employees). So, Bolino, et al. (2002) postulate that specific types of OCB may have different influences on various forms of social capital.

Employees' helping behaviour (i.e. OCBI) can help the organisation to develop its social capital, e.g. trust between employees, cooperation relationship, shared code and language. The final cognitive map of HR (training), organisational learning in terms of knowledge sharing and individual learning, individual behaviour (including in-role behaviour, OCBI and OCBO), HR (rewards) and organisational performance, refers to Figure 6-3.

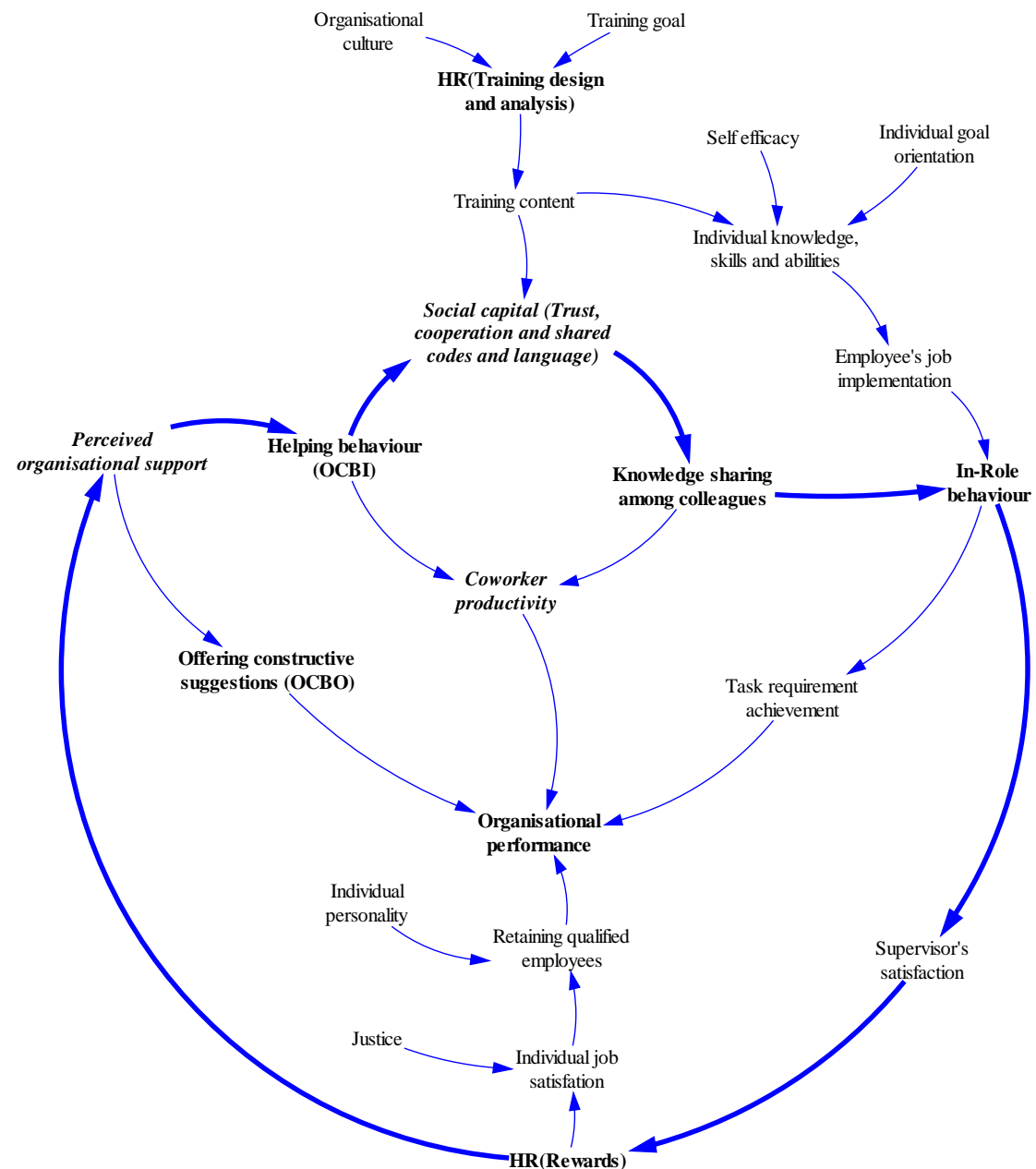


Figure 6- 3: Final cognitive map of HR (training), organisational learning, individual behaviour, HR (Rewards) and organisational performance

Notes: the variables underlined denote variables tested in Chapter 5 quantitative study; the italic variable denotes the mediating variable; the bold arrows emphasize the relationships between organisational learning (in terms of knowledge sharing among colleagues) and individual behaviour, including in-role behaviour and OCBI.

6.3 Discussion and findings of the qualitative study

6.3.1 Validation of the quantitative findings

Refer to Fig. 6-3 of the final cognitive map, the findings in Chapter 5 quantitative study have been confirmed, and the possible mediating variables between the constructs have been identified, as follows:

- (1) HR practice (training) influences employees' in-role behaviour through the improvement of individual knowledge, skills and abilities, social capital development, and knowledge sharing among colleagues.
- (2) HR practice (rewards) influences OCBI and OCBO through employees' perceived organisational support.
- (3) HR practices (training and rewards) affect organisational performance by the aggregation of employees' in-role behaviour, OCBI, OCBO, and co-worker's productivity (relating to co-worker's behaviour).
- (4) Organisational learning (in terms of knowledge sharing among colleagues and individual learning manifested by the improvement of individual knowledge, skills and abilities) mediates the relationship between HR practice (training and rewards) and organisational performance; there are three other mediating variables, social capital, employees' perceived organisational support, and co-worker productivity.

6.3.2 Directional causality between organisational learning and individual behaviour

According to Fig. 6-3 and the related literature, it is found that:

- Organisational learning (in terms of knowledge sharing among colleagues and individual learning) can improve employee's in-role behaviour;
- OCBI (in terms of helping behaviour) can enhance knowledge sharing through the development of social capital;
- The employee's performance of OCBI (in terms of helping behaviour) may help improve his/her in-role behaviour through social capital development and knowledge sharing among colleagues.

Furthermore, the cognitive map in Fig. 6-3 also identifies three meaningful mediating constructs (i.e. social capital, perceived organisational capital, and co-worker

productivity) which have important effects on organisational learning and individual behaviour improvement, see the discussion below.

6.3.3 Social capital in organisations

Social capital as an intangible resource

Social capital in organisations refers to the structure and strength of interpersonal relationships in the organisation social system (Lin, 2001; Bolino, et al., 2002). Lin (2001) gives the definition as: “resources embedded in a social structure that are accessed and/or mobilized in purposive actions (p.29)”. Nahapiet and Ghoshal (1998) identify three dimensions of social capital: (1) a structural dimension (i.e. patterns of interpersonal relationships); (2) a relational dimension (i.e. the quality of interpersonal relationships, e.g. trust, liking); and (3) a cognitive dimension (i.e. the extent to which the employees share common understanding).

From a resource-based view, social capital is one of the important and intangible resources in organisation development (Lin, 2001). Nahapiet and Ghoshal (1998) explain that high-quality relationships between employees (i.e. social capital) satisfy the characteristics of value, rarity, imperfect imitability and non-substitutability (Barney, 1991), and can provide sustained competitive advantage. The value of social capital is manifested in the reduction of transaction costs, and facilitating information flow among employees to solve work-related problems (Bolino, et al., 2002). Wright, et al. (2001) propose that an HR management system creates value which impacts the change, flow and stock of intellectual capital (including human capital, social capital, and organisational capital) over time and forms the basis of competitive advantage.

Fig. 6-3 reveals that both training and rewards can enhance organisational performance through social capital, which is consistent with previous studies. For example, Evans and Davis (2005) provide a framework to explain how HR practices improve organisational performance through the influence on internal social structure, i.e. network ties, generalized norms of reciprocity, shared mental models, etc. Empirically, Youndt and Snell (2004) find that social capital mediates the relationship

between collaborative HR practices (measured items include: our training and development programs incorporate team building; we utilized group-based incentives, e.g. gain-sharing, group bonuses, etc.) and organisational performance.

Role of social capital on knowledge transfer

Fig. 6-3 depicts the role of social capital in the employees' knowledge sharing, which confirms Inkpen and Tsang's (2005) proposition. Inkpen and Tsang (2005) suggest that social capital enhances knowledge transfer between employees in the same social network, and propose the conditions to facilitate knowledge transfer across different dimensions of social capital. Kang, et al. (2007) state that: "social relations are considered more efficient mechanisms for sharing both tacit and explicit knowledge among individuals than are other mechanisms, such as information systems and formal control (p.237)". Further, Grant (1996) proposes that the existence of a common language (e.g. form of symbolic communication, shared meaning, recognition of individual knowledge domains) facilitates employees sharing and integrating knowledge.

Empirically, Collins and Smith (2006) find that social climate has a significant positive effect on knowledge exchange and combination, e.g. trust ($\beta = 0.28$, $p < 0.01$), cooperation ($\beta = 0.32$, $p < 0.01$), and shared codes and language ($\beta = 0.21$, $p < 0.01$). Regarding knowledge acquisition, Yli-Renko, et al. (2001) find that in young technology-based firms, social interactions ($\beta = 0.19$, $p < 0.05$) and network ties ($\beta = 0.49$, $p < 0.001$) positively relate to knowledge acquisition in new product development, technological distinctiveness, and sales cost efficiency, but relationship quality ($\beta = -0.17$, $p < 0.05$) has a negative effect on knowledge acquisition.

The role of HR practices in building social capital

Fig. 6-3 depicts that HR (training) can facilitate social capital, and HR (rewards) can also create social capital through perceived organisational support and helping behaviour. These findings are consistent with Leana and Van Buren's (1999) study that stability in employment relationships may build and maintain social capital. Leana and Van Buren (1999) emphasize the long-term employment relationship

because social capital is built up over time but can be destroyed very quickly by trust-breaking behaviour (e.g. contract violation). So they suggest job tenure and team-based incentives to motivate employees to work collectively.

At the same time, Leana and Van Buren (1999) also discuss other ways through which social capital can be created: (1) organisational reciprocity norms, and (2) bureaucracy and specified roles. At the individual level, individual behaviours (e.g. helping behaviour) may also facilitate the development of social capital.

The role of OCB in social capital

As discussed in Section 6.2.3, helping behaviours create interpersonal trust and closer relationships between colleagues, which reflect the development of social capital (i.e. high-quality relationships between employees), see Fig. 6-3. Theoretically, Bolino, et al. (2002) also explain how OCB can enhance three dimensions of social capital (i.e. structural, relational, and cognitive dimensions), see Section 6.2.3.

6.3.4 Perceived organisational support

Recognition of perceived organisational support

Perceived organisational support refers to the employees' belief that the organisation values their contribution and cares about their well-being (Eisenberger, et al., 1986); that is also called organisational support theory and is developed from social exchange theory (Rhoades and Eisenberger, 2002). Perceived organisational support reflects the establishment and maintenance of the employee-employer relationship, and relates to psychological contracts (Aselage and Eisenberger, 2003). For example, Aselage and Eisenberger (2003) explain that: "organisational support theory maintains that, based on the norm of reciprocity, employees strive to repay the organization for a high level of support by increasing their efforts to help the organization reach its goals (p.492)".

Previous empirical studies (Moorman, et al., 1998; Wayne, et al., 1997; Rhoades and Eisenberger, 2002) confirm that perceived organisational support can motivate employee's extra-role behaviour, including OCBI and OCBO, which then aggregately contribute to the improvement of organisational performance.

The role of HR (Rewards) on perceived organisational support

Fig. 6-3 depicts the effect of HR (Rewards) on employee's perceived organisational support, which is consistent with Allen, et al.'s (2003) empirical findings that fairness of rewards positively relates to perceived organisational support ($\beta = 0.26$, $p < 0.05$). Allen, et al. (2003) also find that participation in decision making ($\beta = 0.36$, $p < 0.05$) and growth opportunity ($\beta = 0.29$, $p < 0.05$) have a positive effect on perceived organisational support in the sample of 264 salespeople in a store in USA. For other HR practices, Wayne, et al. (1997) find that developmental experiences (i.e. participating in formal or informal training), promotions, and organisational tenure may positively influence perceived organisational performance.

Except for HR practices, there are other antecedents of perceived organisational support. Rhoades and Eisenberger (2002) summarize the antecedents as: fairness, supervisor support, job conditions, and employee characteristics (including personality and demographic characteristics).

6.3.5 Co-worker productivity

According to Fig. 6-3, helping behaviour and knowledge sharing improve organisational performance through co-worker productivity. The finding is consistent with Podsakoff, et al.'s (2000) suggestion that one possible reason that OCB can contribute to organisational success is enhancing co-worker and managerial productivity.

Helping behaviour can affect co-worker productivity directly and indirectly through social capital creation and knowledge sharing among colleagues, which contribute to organisational performance. This finding addresses the issue raised by Organ (1997)

which is repeated by Podsakoff, et al. (2009). The issue is: “we are left with a ‘black box’ of ‘process’.... although we have some reassuring data in support of the connection between OCB and systemic performance, little if any analysis has dealt with the means by which OCB has these effects” (Organ, 1997, p.95).

It is important to note that when there is lack of training activity to improve employees’ in-role behaviour in an organisation, individual helping behaviour and knowledge sharing among colleagues, as alternatives, can improve co-worker’s knowledge, skills and abilities, and then to improve co-worker’s productivity which contribute to organisational performance.

In sum, the findings of the qualitative study have been discussed above. There are some mediating mechanisms which can be tested empirically by structural equation modelling to statistically support the qualitative findings.

6.4 Testing the structural equation models formulated from the cognitive map

Based on the cognitive map of Fig.6-3, the potential mediating mechanisms have been identified between the main constructs in this study: (1) social capital as a mediating variable between training practice and knowledge sharing; (2) OCBI can elicit knowledge sharing through the development of social capital; (3) employees’ perceived organisational support exists as a mediating variable between rewards practice and OCB, including OCBI and OCBO; (4) co-worker productivity exists as a mediating variable between OCBI and organisational performance, and between knowledge sharing and organisational performance.

The causal-effect relationship between organisational learning and individual in-role behaviour has also been identified according to the cognitive map of Fig.6-3.

Organisational learning, in terms of individual learning (to improve individual knowledge, skills and ability) and knowledge sharing among individuals, can improve employees’ in-role behaviour which, then, contributes to organisational performance

through the achievement of task requirement. This causal-effect relationship is tested by the structural equation model depicted in Fig. 6-4 using the sample data presented in Chapter 5.

6.4.1 Structural equation model of “organisational learning – in-role behaviour – organisational performance”

The structural equation model of “organisational learning – in-role behaviour – organisational performance” is developed by the maximum likelihood estimation method in Amos 18.0. The model fit is assessed by goodness-of-fit indices, shown in Table 6-2. Selected multiple goodness-of-fit statistics in Table 6-2 shows the model fits the data very well (SRMR = 0.054 < 0.1; RMSEA = 0.065 < 0.1; CFI = 0.915 > 0.9; IFI = 0.916 > 0.9; TLI = 0.905 > 0.9).

Table 6- 2: Goodness-of-fit indices for “organisational learning – in-role behaviour – organisational performance” model

	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Structural equation model	490.27	206	2.380	.054	.065	.915	.916	.905
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Legend: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

The output standardised model of “organisational learning – in-role behaviour – organisational performance” is shown in Figure 6-4, and the unstandardised, as well as the standardised and maximum likelihood parameter estimates are presented in Table 6-3. All the parameter estimates are statistically significant ($P < 0.01$) and substantively meaningful. Results show that organisational learning has a positive significant impact on employee’s in-role behaviour ($\beta = 0.19$, $p < 0.01$) which, then, has a positive significant impact on organisational performance ($\beta = 0.15$, $p < 0.01$). Organisational learning has a directly positive significant impact on organisational performance ($\beta = 0.73$, $p < 0.001$). It is noted that 60% of the variance associated with organisational performance is accounted for by organisational learning and employee’s in-role behaviour.

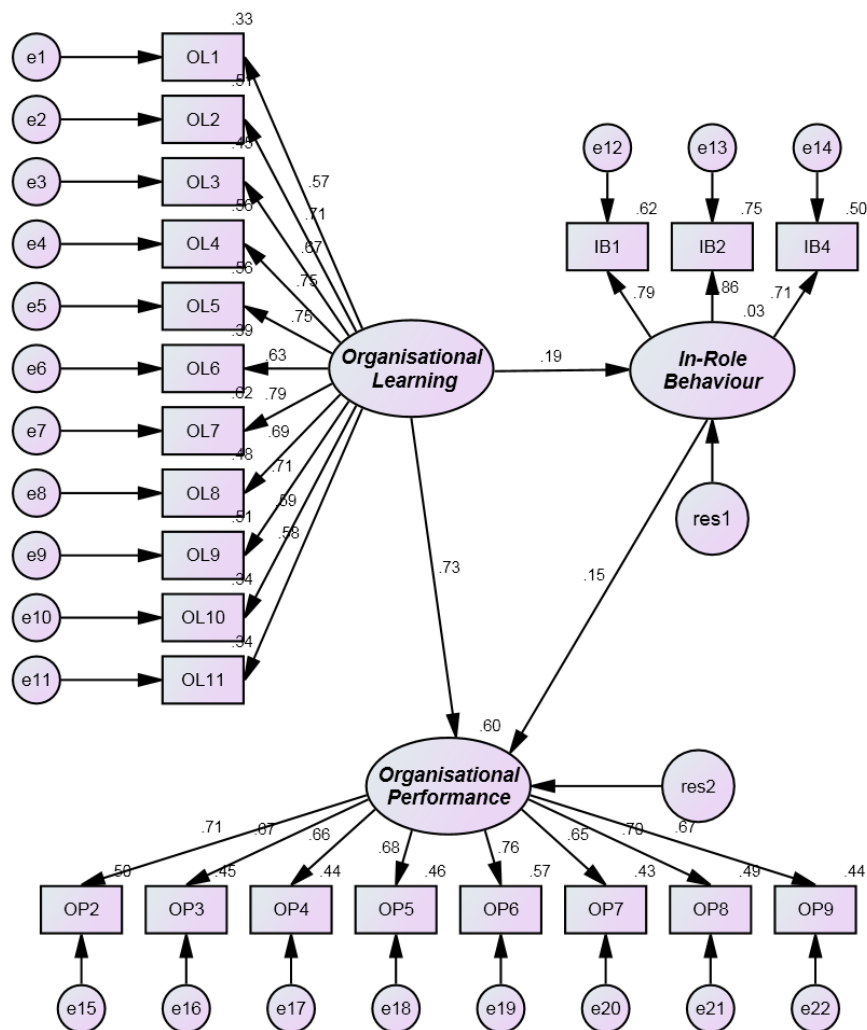


Figure 6- 4: Output standardised path diagram _ “organisational learning – in-role behaviour – organisational performance” model

Table 6- 3: Regression weights for “organisational learning – in-Role behaviour – organisational performance” model

Regression Path			Standardised Estimate	Unstandardised Estimate	S.E.	C.R.	P-Value
In-Role Behaviour	<---	Organisational Learning	0.185	0.162	0.057	2.865	0.004
Organisational Performance	<---	Organisational Learning	0.733	0.613	0.073	8.39	***
Organisational Performance	<---	In-Role Behaviour	0.150	0.143	0.047	3.075	0.002

Note: S.E. = standard error of the covariance; C.R. = critical ratio;

P-value is significant at $P < 0.05$, ***, $P < 0.001$.

The regression results cross-validate the qualitative findings statistically that: (1) organisational learning (e.g. knowledge sharing among colleagues, individual learning) improves employee's in-role behaviour ($\beta = 0.19$, $p < 0.01$); (2) employee's in-role behaviour improves organisational performance ($\beta = 0.15$, $p < 0.01$) when organisational learning is present in this model, compared with the model of "HR practices – in-role behaviour – organisational performance" (see Fig. 5-12) that employee's in-role behaviour has an insignificant impact on organisational performance ($\beta = 0.05$, $p = 0.366$) when only HR practices are present. The above quantitative findings imply that: the condition that employee's in-role behaviour contributes to organisational performance is the presence of organisational learning; and HR practices do not impact on individual in-role behaviour directly but do so through organisational learning.

The quantitative study in Chapter 5 found that organisational learning has a mediating effect between HR practices and organisational performance, and that HR practices has a positive, significant impact on employee's in-role behaviour. Hence, the construct of HR practices is input to the above model (see Fig. 6-4) to test the relationships in the structural equation model "HR practices – organisational learning – in-role behaviour – organisational performance", refer to Fig. 6-5.

6.4.2 Structural equation model of "HR practices – organisational learning – in-role behaviour – organisational performance"

The model of "HR practices – organisational learning – in-role behaviour – organisational performance" is assessed, first, by goodness-of-fit indices and modified according to the modification index. Then, three changes are made respectively, i.e., revised model 1 (covariance between errors of OP2 and OP3), revised model 2 (covariance between errors of HR21 and HR22), and revised model 3 (covariance between errors of OL4 and OL5). The fourth row in Table 6-4 shows the revised model 3's multiple goodness-of-fit indices, which indicate the acceptable fit of the model to the data (SRMR = 0.059 < 0.1; RMSEA = 0.058 < 0.1; CFI = 0.887 close to 0.9; IFI = 0.888 close to 0.9; TLI = 0.879 close to 0.9).

Table 6- 4: Goodness-of-fit indices for path analysis “HR practices – organisational learning – in-role behaviour – organisational performance” model

Model	χ^2	d.f.	$\chi^2/\text{d.f.}$	SRMR	RMSEA	CFI	IFI	TLI
Original Model	1371.6	621	2.209	.061	.061	.875	.876	.866
Revised model 1 by Connecting e15 and e16	1335.7	620	2.154	.060	.060	.881	.882	.872
Revised model 2 by Connecting e24 and e25	1310.9	619	2.118	.059	.059	.885	.886	.876
Revised model 3 by Connecting e4 and e5	1294.0	618	2.094	.059	.058	.887	.888	.879
Levels of acceptable fit				≤ 0.10	≤ 0.10	≥ 0.9	≥ 0.9	≥ 0.9

Note. Original model: High modification index indicated high error covariance between Item OP2 and OP3 (MI = 33.477). Revised model 1: High modification index indicated high error covariance between Item HR21 and HR22 (MI = 23.631). Revised model 2: High modification index indicated high error covariance between Item OL4 and OL5 (MI = 16.172).

Legends: SRMR, root mean square error of approximation; RMSEA, standard root mean square residual; CFI, comparative fit index; IFI, incremental fit index; TLI, non-normed fit index.

The output standardised model of HR practices for organisational performance is shown in Figure 6-5, and the unstandardised, as well as the standardised and maximum likelihood parameter estimates are presented in Table 6-5. All the parameter estimates are statistically significant ($P < 0.01$) and substantively meaningful. The results of this model are consistent with previous quantitative findings: HR practices have a positive significant impact on organisational learning ($\beta = 0.95$, $p < 0.001$); organisational learning has a positive significant impact on organisational performance ($\beta = 0.76$, $p < 0.001$); organisational learning has a positive significant impact on employee's in-role behaviour ($\beta = 0.21$, $p < 0.01$); and employee's in-role behaviour has a positive significant impact on organisational performance ($\beta = 0.13$, $p < 0.01$).

Table 6- 5: Regression weights for “HR practices – organisational learning – in-role behaviour – organisational performance” model

Regression Path			Standardised Estimate	Unstandardised Estimate	S.E.	C.R.	P-Value
Organisational Learning	<---	HR Practices	0.951	0.676	0.061	11.021	***
In-Role Behaviour	<---	Organisational Learning	0.207	0.177	0.055	3.218	0.001
Organisational Performance	<---	Organisational Learning	0.76	0.637	0.072	8.835	***
Organisational Performance	<---	In-Role Behaviour	0.131	0.128	0.046	2.763	0.006
Employment Relation	<---	HR Practices	0.974	0.635	0.056	11.4	***
Staffing	<---	HR Practices	0.725	0.535	0.054	9.89	***
Rewards	<---	HR Practices	0.626	0.573	0.063	9.165	***
Training	<---	HR Practices	0.71	0.665	0.059	11.227	***

Note: S.E. = standard error of the covariance; C.R. = critical ratio;
P-value is significant at $P < 0.05$, ***, $P < 0.001$.

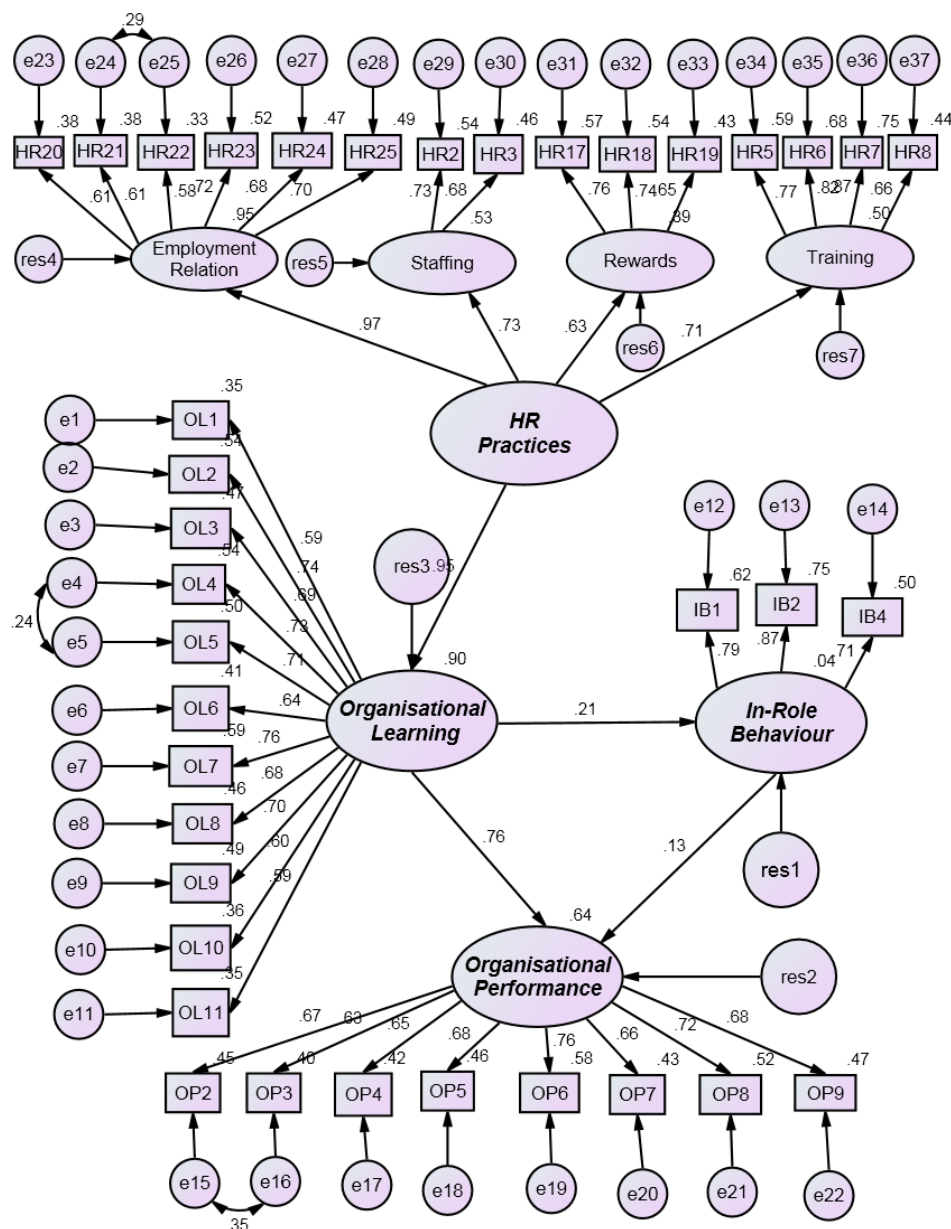


Figure 6- 5: Output standardised path diagram _ “HR practices – organisational learning – in-role behaviour – organisational performance” model

Refer to Fig. 6-6, the findings are:

- (1) HR practices have indirect impact on in-role behaviour ($\beta = 0.95 \times 0.21 = 0.20$, $p < 0.01$), which is consistent with the finding in Section 5.5.1 (see Fig. 5-12) in which HR practices have a positive significant impact on in-role behaviour ($\beta = 0.29$, $p < 0.001$). That means HR practices can improve organisational performance through their indirect influence on individual's in-role behaviour.

- (2) HR practices enhance organisational performance through their influence on the mediator, organisational learning, which is consistent with the quantitative finding (see Fig. 5-15) in Chapter 5.
- (3) Individual in-role behaviour mediates the relationship between organisational learning and performance, and such in-role behaviours are influenced by HR practices. Thus, Hypothesis 2 is partially supported statistically regarding in-role behaviour.
- (4) Organisational learning has both direct impact on organisational performance ($\beta = 0.76$, $p < 0.001$) and indirect impact on organisational performance through individual's in-role behaviour ($\beta = 0.21 \times 0.13 = 0.03$, $p < 0.01$).

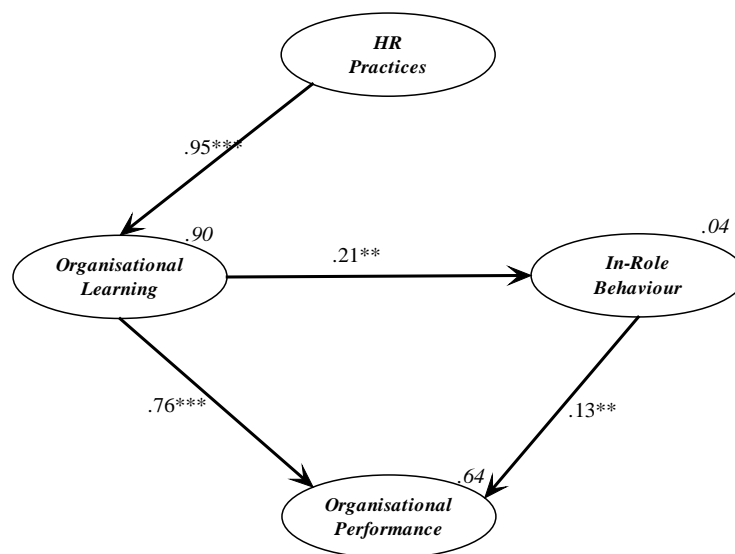


Figure 6- 6: Simplified path diagram of “HR practices – organisational learning – in-role behaviour – organisational performance” model.

Note: ***, $p < 0.001$; **, $P < 0.01$

6.5 Summary

In the qualitative studies, a cognitive map (see Fig. 6-3) is produced by causal mapping method. The results of the qualitative studies validate the quantitative findings and determine the mediating variables: social capital, perceived organisational support and co-worker productivity. The mediating effects are as follows:

- (1) HR (training) can build social capital, and HR (rewards) can also create social capital through perceived organisational support and helping behaviour; social capital can elicit knowledge sharing among colleagues.
- (2) HR (Rewards) effect employees' perceived organisational support, which then motivates employee's OCBI and OCBO.
- (3) Helping behaviour and knowledge sharing improve organisational performance through co-worker productivity.

The directional causality between organisational learning and individual behaviour is also identified as: organisational learning (in terms of knowledge sharing among colleagues and individual learning) can improve employees' in-role behaviour; OCBI (i.e. helping behaviour) can arouse knowledge sharing through the development of social capital.

The model of "HR practices – organisational learning – in-role behaviour – organisational performance" is tested by structural equation modelling. The results show that: HR practices can improve organisational performance through their indirect influence on individual's in-role behaviour; individual in-role behaviour mediates the relationship between organisational learning and performance, and such in-role behaviours are influenced by HR practices, so Hypothesis 2 (Employees' behaviours mediate the relationship between organisational learning and performance and such behaviours are influenced by human resource practices.) is partially supported statistically regarding in-role behaviour.

In the conclusions chapter, the implications of the findings for construction industry and future research are discussed.

Chapter 7 Conclusion

This research is a small step toward the ‘Big Ideas’ surrounding human resource. In this conclusion chapter, the achievement of objectives, implications of the findings, research limitations and recommendations for future research are discussed respectively.

7.1 Achievement of the Objectives

Objective 1: to justify the implementation of construct measurement instruments in the context of Chinese construction SOEs

The measurement scales are adapted from previous studies and translated into Chinese by the ‘translation/back-translation’ technique. Then, the measurement scales are modified by consulting with two industry experts and two academic researchers to ensure that the scales are meaningful in the context of Chinese construction SOEs. For the final questionnaire in English and Chinese, refer to Appendix I and II. Exploratory and confirmatory factor analyses are then employed to test the reliability and validity of the scales. The results demonstrate that:

- The second-order measurement scale of HR practices (including four factors of employment relation (i.e. job description and participation), training, staffing, and rewards) has desirable model fit to data, which means the observed items are reasonable measures of the respective HR factors. But the observed items for job security, mobility and appraisal are not reliable and valid. So, future efforts are required to search for “emic” indicators unique to China’s context.
- The reliability coefficient for organisational learning shows the internal consistency among the observed items. Validity test by confirmatory factor analysis identifies that one factor (i.e. organisational learning) can underlie all the eleven observed items with a good model fit to the data.
- The reliability of organisational performance measurement scale is satisfied by a high Cronbach alpha reliability coefficient. Confirmatory factor analysis

result also demonstrates the general factor “organisational performance” can explain the eight observed items, excluding revenue growth because of low consistency with other items and construction quality because of high correlation with client’s satisfaction.

- Employee’s in-role behaviour is finally measured by three observed items. Four original items are deleted because of an extreme non-normality problem or poor internal consistency with other measured items.
- OCBI is finally measured by four observed items, which are internally consistent and valid to manifest the unique factor of OCBI.
- The observed items of OCBO have problems of non-normal data distribution or poor internal consistency, so the variable of OCBO is removed from the subsequent quantitative hypotheses testing.

In sum, Objective 1 to justify the implementation of the measurement scales is achieved. But future efforts to develop more a reliable individual behaviour scale (including in-role and OCB) in the Chinese context should include more observed indicators unique to the local context (i.e. emic styles) combined with the existing scale in Western literature (i.e. etic style).

Objective 2: to examine the influences of HR practices on employees’ behaviours and organisational learning

In the quantitative study, structural equation modelling method is used to test Hypotheses 1-a and 1-b (see Section 4.1). Then, in qualitative study, the cognitive map is produced by the causal mapping method to confirm the quantitative findings and identify the possible mediating mechanisms between the main constructs in the complex and dynamic context of Chinese construction SOEs. The findings include:

- HR practices have positive effect on employees’ behaviour, including in-role behaviour ($\beta = 0.29$, $p < 0.001$) and OCBI ($\beta = 0.48$, $p < 0.001$), refer to Fig. 5-12. HR practices can improve organisational performance by their indirect influence on individual’s in-role behaviour through organisational learning,

refer to Fig. 6-6. So, Hypothesis 1-a (HR practices enhance organisational performance through their positive influences on employees' in-role and extra-role behaviours, i.e. in-role and extra-role behaviours are mediating variables of the relationship between HR practices and organisational performance.) is partially supported.

- The qualitative study finds that HR (training) influences employees' in-role behaviour through the improvement of individual knowledge, skills and abilities, and knowledge sharing among colleagues is the consequence of organisational social capital; HR practice (rewards) influences OCBI and OCBO through employees' perceived organisational support.
- The mediating effect of organisational learning between HR practices and organisational performance is found in both quantitative and qualitative studies. In the mediating model, see Fig. 5-15, HR practices (staffing, training, rewards, job description and participation) positively affect organisational learning ($\beta = 0.95$, $p < 0.001$), and organisational learning positively affect performance ($\beta = 0.53$, $p < 0.05$), but the relationship between HR practices and organisational performance becomes insignificant ($\beta = 0.26$, $p = 0.31$) compared with the regression coefficient of direct relationship ($\beta = 0.77$, $p < 0.001$). So H1-b (HR practices enhance organisational performance through their positive influences on organisational learning, i.e. organisational learning is a mediating variable of the relationship between HR practices and organisational performance.) is fully supported.
- In the qualitative study, see Fig. 6-3, the mediating variables exist between HR practices, organisational learning and performance, e.g. social capital, employees' perceived organisational support, and co-worker productivity.

In sum, Objective 2 is achieved except for the effect of HR practices on OCBO which has not been tested statistically because of its low scale reliability.

Objective 3: to examine the relationships of employees' behaviours and organisational learning and their impact on organisational performance

Because there are few studies investigating the relationship between organisational learning and individual behaviour, qualitative data analysis is employed first by the causal mapping method to find the complex cause-effect relationships between organisational learning, individual behaviour and their impact on organisational performance. Then, the cause-effect routes captured from the cognitive map are tested by structural equation modelling. Finally, Objective 3 is achieved according to the following findings:

- The cognitive map (see Fig. 6-3) shows that organisational learning (in terms of knowledge sharing among colleagues and individual learning) can improve employee's in-role behaviour; and OCBI (in terms of helping behaviour) can arouse knowledge sharing through the development of social capital.
- Then, the model of "HR practices – organisational learning – in-role behaviour – organisational performance" is tested statistically, see Fig. 6-6. Individual in-role behaviour mediates the relationship between organisational learning and performance, and such in-role behaviours are influenced by HR practices indirectly, so Hypothesis 2 (Employees' behaviours mediate the relationship between organisational learning and performance and such behaviours are influenced by human resource practices.) is partially supported statistically regarding in-role behaviour. This finding implies that the condition that employee's in-role behaviour can contribute to organisational performance is organisational learning's presence, and HR practices may not impact on individual in-role behaviour directly but through organisational learning.
- Organisational learning has both direct impact on organisational performance ($\beta = 0.76$, $p < 0.001$) and indirect impact on organisational performance through individual's in-role behaviour ($\beta = 0.21 \times 0.13 = 0.03$, $p < 0.01$).

In conclusion, from the theoretical perspective, the results reveal the following. (1) Individual in-role behaviour has highly significantly positive effect on organisational performance. Organisational learning has very highly significantly positive effect on organisational performance. Both individual in-role behaviour and organisational learning have mediating effects on the relationship between HR practices and organisational performance. (2) HR practices positively affect individual in-role

behaviour indirectly through organisational learning. Individual in-role behaviour mediates the relationship between organisational learning and organisational performance. (3) HR practices also affect organisational performance via the pathway of social capital, individual perceived organisational support, organisational citizenship behaviour (OCB), and co-worker productivity.

7.2 Implications

The findings mentioned above have several implications for Chinese construction SOEs. First, in our understanding, Chinese state-owned enterprises have institutional constraints in the traditional economy of China. However, this research finds that HR practices in Chinese construction SOEs includes multi-dimensional practices of job description, participation, training, staffing, and rewards, which is consistent with strategic HR practices in a Western context. It is found that HR practices have a significant positive effect on organisational performance. The result indicates that Chinese construction SOEs should adopt multiple HR practices in their personnel management to achieve competitive advantage; and changes about HR strategy and planning should be adapted to a firm's strategy.

Second, it is found that effects of HR practices (i.e. job design, participation, training, staffing, and rewards) on OCBI is nearly twice that of HR practices on individual in-role behaviours ($\beta = 0.48$ vs 0.29 , $p < 0.001$), which means that in Chinese construction SOEs HR practice can affect and arouse more employees' extra-role behaviour than in-role behaviour. Based on the qualitative findings, OCBI is helpful in building social capital and improving co-worker productivity which contributes to organisational performance. The findings identify OCBI's importance in construction firms to develop organisational, social and psychological climate in which in-role behaviours operate. Construction firms are project-based organisations and comprise various projects which have fragmented and dynamic project procurement processes. Success of projects depend on skilled labour and professional staff from different functional departments who coordinate and apply their skills (and behavioural scripts) during project realisation. So, construction firms' managers and project managers should understand the importance of OCBI in different coordination conditions for

project tasks completion. Regarding HR practices, construction firms should try to recruit employees with more inclination in helping others in addition to the requirement of qualified work skills and abilities; moreover, participation and rewards practices should pay more attention to motivating employees to perform their OCBI.

Third, it is found that HR practices indirectly improve organisational performance through their effects on organisational learning (in terms of individual learning, team learning, internal knowledge sharing, lessons learnt, collaborative work schemes, internal improvement schemes, learning from others, continuous renewal of business processes, seeking new developments, and standard document and experts directions). Organisational learning capability should be viewed by managers of construction firms as one of the competitive advantages in the process of firm development, because learning is the mediating mechanism through which HR practices can improve organisational performance. In managerial implications, managers of construction firms should adopt multiple learning practices, e.g. providing workshops and seminars to offer employees opportunities to share their knowledge; post-project reviews to summarize lessons; arranging project teams to innovate new construction techniques, methods or materials; motivating project teams to learn from their joint ventures, employers and sub-contractors; preparing standard work procedures and documents experts' directions to store knowledge. Furthermore, learning orientation based on shared values should be developed for all levels from general employees, middle project managers to firm-level managers.

Fourth, individual in-role behaviour mediates the relationship between organisational learning and performance. Individual in-role behaviour (also called task behaviour or task performance) is recognized by formal reward systems, and its requirement is prescribed. So, a proper reward system should be designed to motivate employees to apply their knowledge, skills and abilities in job-related performance, and the individual job should be clearly and precisely defined. Firms' managers should understand the importance of retaining qualified and experienced staff, who own the tacit knowledge and experience which may not be transferred to other colleagues or stored in organisational knowledge. So, the practices regarding appraisal and promotion for the qualified staff should be designed to attract and retain them. The mediating effect of in-role behaviour also indicates that the individual is the key to

organisational learning, because it is individual thinking and acting that produces learning (Argyris, 1995). For example, Spender (1996) proposes the relationship between organisational learning and individual active involvement to develop “a more democratic notion of firm”. The implication is that “top management would do better to provide a context in which employees at every level become independent agents, take responsibility, experiment and make mistakes and learn as they strive for continuous improvement in every aspect of the firm’s total transformation process (Spender, 1996, p.47)”.

Fifth, perceived organisation support is very important to elicit employees’ extra-role behaviour in terms of OCBI and OCBO; rewards may influence perceived organisational performance according to the qualitative findings. So, the firms’ managers should be aware of the importance of employees’ perceived organisational support, and understand that: “HR practices serve as signals to employees about the extent to which the organisation values and cares about them as individuals (perceived organisation support), which then contribute to the withdrawal process (Allen, et al., 2003, p.114)”. If the employee perceives that the organisation treats him/her well and recognises his/her contribution, based on the norm of reciprocity, he/she will “repay the organisation for a high level of support by increasing his/her efforts to help the organisation reach its goals (Aselage and Eisenberger, 2003, p.492)”.

Sixth, social capital, which refers to the structure and strength of interpersonal relationships in the organisational social system, has been found to be one antecedent of knowledge sharing among colleagues. Firms’ managers should be aware that social capital is one of the important and valuable assets in organisation development. Both training and rewards can enhance organisational performance through social capital (e.g. network ties, generalized norms of reciprocity, shared mental models). Teamwork and encouraging employees to participate in decision making is an important way to create social capital, and the team-based incentive policy is also an effective way to motivate employees to work collectively rather than individually. Both teamwork and team-based incentive policy can be applied in construction firms because of their project-based characteristics. Uhl-Bien, et al. (2000) propose relationship-based HR functions, i.e.: selection should include ‘relationship potential’ in addition to traditional person-job fit; performance appraisal can include evaluating

employees' abilities to consistently generate positive work relationships. Youndt and Snell (2004) even explain that: "it appears one of the quickest and best ways to build a trusting and open culture where people freely share and seek information is to eliminate as many horizontal organisational barriers as possible (p.354)." So, construction firms can build social capital by breaking down the functional, divisional, and other barriers to improve the quality of relationships between employees. OCBI is also identified to create social capital, which again demonstrates the importance of OCBI.

7.3 Limitations

As with any research, there are limitations to this study. First, HR practices of job security, mobility and appraisal are not included in the hypotheses testing, because the measurement scales are not reliable and valid in the context of Chinese construction SOEs.

Second, the quantitative research is conducted by a cross-sectional questionnaire survey, and the time period for measuring organisational performance is not considered, which may bias the direction of causality findings.

Third, the constructs of HR practices and organisational performance are measured by the respondents' perception at the individual level, however, the different nature of the construct level may affect the statistical results, i.e. HR practices and organisational performance can be measured at the organisational level, and individual behaviour is measured at the individual level, so the data collected from the same respondent may produce common method bias.

Fourth, there are other potential moderators/mediators that may explain the relationship between HR practices and organisational performance which are not controlled in this study, e.g. organisational strategy, structure, technology.

Fifth, the sample size (8 interviewees) for the qualitative study is relatively small to reveal the cognitive map, e.g. employees' understanding of how training and rewards

practice affect their in-role behaviour and OCB. The difference between “true” and “revealed cognitive map” may exist, because “true causal maps of individuals cannot actually be captured since they reside inside people’s minds (Nelson, et al., 2000, p.481)”. Furthermore, the validity of operationalization of concepts and causal-effect loops deserve to be investigated in future studies.

7.4 Recommendations for future research

Social capital and perceived organisational support are identified in the cognitive map from the qualitative study. These two constructs deserve to be investigated further. The details are explained in below.

Social capital

In the context of Chinese construction organisations, the cognitive map (Fig. 6-3) in qualitative study reveals that the social capital is essential in knowledge sharing among colleges which can improve the colleges’ productivity, especially when there is lack of training activities to improve employees’ in-role behaviour. The cognitive map also shows the training activities and helping behaviour can create social capital. So, how to create social capital within the organisation deserves to be investigated in the future. What are the antecedents influencing the development of social capital? What are the consequences of the social capital? How does social capital contribute to the individual productivity and then, to organisational performance improvement?

In order to answer these questions, the validity of operationalization of social capital needs to be investigated first in the specific context. Previous studies have given some insights of the construct of social capital. Nahapiet and Ghoshal’s (1998) three dimensions of social capital have been accepted and adopted by other researchers (e.g. Bolino, et al., 2002; Inkpen and Tsang, 2005) in terms of: (1) a structural dimension (i.e. patterns of interpersonal relationships); (2) a relational dimension (i.e. the quality of interpersonal relationships, e.g. trust, liking); and (3) a cognitive dimension (i.e. the extent to which the employees share common understanding). Inkpen and Tsang (2005) argue that the concept of social capital is still in the “emerging excitement”

stage and the issue of construct validity needs to be addressed (e.g. the form of both individual and organisational social capital). Leana and Van Buren (1999) identify organisational social capital, as a by-product of other organisational activities, has two primary components of associability and trust. In China's context, Chinese are very conscious of group harmony and face saving (Kirkbride et al, 1991), so social capital (such as interpersonal harmony) is important for Chinese employees (e.g. managing conflict) and organisations (e.g. improving knowledge transfer between employees). Regarding the measurement, Collins and Smith (2006) measure organisational social climate by three dimensions as trust, cooperation, and shared codes and language, the scales of which are developed by previous researchers; Youndt and Snell (2004) develop a 5-item scale to develop social capital.

The construct of social capital in either individual or organisational form needs to be investigated in the specific context, e.g. the employees' perception for social capital, operational construct in measurement, and antecedents to build social capital. The mixed methodology is recommended to understand the whole story regarding social capital. For example, the qualitative study can be designed to investigate the meaning of social capital in the specific context and to identify the indicators to measure it; the quantitative study can be designed from a large sample of data to test the relationship between social capital and knowledge sharing, and the relationship between OCB and social capital.

Perceived organisational support

From the cognitive map (Fig. 6-3), perceived organisational support is important to motivate employees' OCBI (e.g. helping behaviour) which improve the co-worker's productivity and then contribute to the organisational performance indirectly. The rewards practice, in some extent, influences employees' perceived organisational support, according to Fig. 6-3. But how do rewards practices (e.g. intrinsic and extrinsic reward practices) influence perceived organisational support? Are there other factors affect perceived organisational support? What's the consequence of perceived organisational support increase? All these questions deserve to be investigated.

In the context of Chinese organisations, they operate in a rapidly changing institutional environment because of national economic reform (Li, et al., 2005), so Chinese SOEs employees' perceived organisational support should be different from previous situations with their firms' conversion from the traditional plan and system (i.e. the firm's target is to satisfy the State's requirement and plan) to a modern enterprise system (i.e. the objectives of the firm include normal commercial indicators in addition to the State's plan) (Li, et al., 2005; Warner, 2008). Eisenberger, et al. (1986) define perceived organisational support as the employees' belief that the organisation values their contribution and cares about their well-being. Individual perceived organisational support has various consequences (Rhoades and Eisenberger, 2002), including organisational affective commitment, job-related affect, job involvement, employees' performance (including in-role performance, OCBI and OCBO), strains, desire to remain with organisation, and withdrawal behaviour. Eisenberger, et al. (1986) have developed the original scale to measure perceived organisational support, which is also adopted by Moorman and Niehoff (1998) and Allen, et al. (2003).

Hence, the validity of the operationalization of perceived organisational support should be designed from the interpretivism position in the specific context, e.g. the dimension and measurement of the construct, the antecedents and consequences of perceived organisational support. The quantitative research is also recommended to test the cause-effect routes identified in the qualitative study, e.g. the relationship between HR practices and perceived organisational support, and the relationship between perceived organisational support and OCB.

Except for the recommendations discussed above, there are three other directions recommended for future inquiry:

- The indicators to measure HR practices (e.g. job security, mobility and appraisal) and more reliable individual behaviour scale (including in-role behaviour and OCB) in the China's context.

- The longitudinal organisational performance data should be collected to clarify the causal relationship between HR practices, organisational learning and organisational performance.
- Organisational strategy, structure, technology, and ownership types should be investigated in future research to find the mechanisms by which they impact on organisational performance through HR practices and organisational learning.

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Appendix

Appendix I: Questionnaire scale

Part 1 Human Resource Practices

Below are items that organizations may use in the HR management. For each item, indicate the extent of your agreement or disagreement as a description of the practices employed by your company.

(1) strongly disagree; (2) moderately disagree; (3) neither disagree nor agree; (4) moderately agree; (5) strongly agree.

1	Great efforts are taken to select the right person.	1 2 3 4 5
2	Long-term employee potential is emphasized.	1 2 3 4 5
3	The Members of the department or project team of which the new worker will be part, participate in the selection of candidates.	1 2 3 4 5
4	In the selective process not only is knowledge and experience taken into account, but also the capacity to work in synergy and continuous learning.	1 2 3 4 5
5	Formal training programs are provided for employees.	1 2 3 4 5
6	There are comprehensive training policies and programs	1 2 3 4 5
7	There are formal training programs to teach new staffs the skills they need to perform their job.	1 2 3 4 5
8	There is training for problem-solving ability.	1 2 3 4 5
9	Employees have few opportunities for upward mobility. (R)	1 2 3 4 5
10	Promotion in this organization is based on seniority. (R)	1 2 3 4 5
11	Employees have clear career paths in this organization.	1 2 3 4 5
12	Employees in this job can be expected to stay with this organization for as long as they wish.	1 2 3 4 5
13	Job security is almost guaranteed to employees in this job.	1 2 3 4 5
14	Performance appraisals are based on objective quantifiable results.	1 2 3 4 5
15	Performance appraisals are based on employee's behaviours.	1 2 3 4 5
16	Employee appraisals emphasize long term and group-based achievement.	1 2 3 4 5
17	The organization has a mixed system of rewarding: fixed + variable.	1 2 3 4 5
18	Individuals in this job receive bonuses based on the profit of the organization or the project.	1 2 3 4 5
19	The company offers incentives to its employees related to their performance.	1 2 3 4 5
20	The duties in his job are clearly defined.	1 2 3 4 5
21	The job has an up-to-date description.	1 2 3 4 5
22	The job description for a position accurately describes all of the duties performed by individual employees.	1 2 3 4 5
23	Employees in this job are often asked by their supervisor to participate in decisions.	1 2 3 4 5
24	Inform the employees about economic and strategic information.	1 2 3 4 5
25	Employees are provided the opportunity to suggest improvements in the way things are done.	1 2 3 4 5
26	Supervisors keep open communications with employees in this job.	1 2 3 4 5

'R' represents 'Reverse-coded'.

Part 2 Organizational Learning

Please circle the number which indicates your opinion about the organizational learning employed by your company.

(1) strongly disagree; (2) moderately disagree; (3) neither disagree nor agree; (4) moderately agree; (5) strongly agree.

1	The organization supports staffs' continuous individual learning.	1 2 3 4 5
2	The organization addresses team improvement through team communication.	1 2 3 4 5
3	The organization has meetings or develops online website to motivate staffs to sharing their knowledge and experience.	1 2 3 4 5
4	The organization has meetings to learn the lessons from past experiences (successful or failed projects).	1 2 3 4 5
5	The organization integrates learning of the advantages from collaborative organizations (e.g. sub-contractors, joint venture).	1 2 3 4 5
6	The organization investigates new construction methods or building materials within the firm or by arrangement with others.	1 2 3 4 5
7	The organization addresses improvement through learning from consultant organizations, rivals or employers.	1 2 3 4 5
8	The organization changes its construction program to adapt the variety in the environment.	1 2 3 4 5
9	The organization seeks new development in construction sector.	1 2 3 4 5
10	The organization has standard reusable documents (e.g. project management, work schedule)	1 2 3 4 5
11	The organization has directions of experts according to their fields, so as to find an expert on a concrete issue at any time.	1 2 3 4 5

'R' represents 'Reverse-coded'.

Part3 Organizational Performance

Please circle the number which indicates your perception of your company's performance over the past 3 years.

(1) very bad; (3) Neutral; (5) very good.

1	Revenue growth.	1 2 3 4 5
2	Profit growth.	1 2 3 4 5
3	Market share.	1 2 3 4 5
4	The organization meets its objectives.	1 2 3 4 5
5	The organization uses the fewest possible resources to meet its objectives.	1 2 3 4 5
6	The organization is developing its capacity to meet future opportunities and challenges.	1 2 3 4 5
7	The satisfaction of clients.	1 2 3 4 5
8	The satisfaction of employees.	
9	The innovation for construction method, material, and project management method.	1 2 3 4 5
10	The construction quality.	1 2 3 4 5

Part 4 Individual Behaviour

Please circle the number which indicates your behaviour in your company.

(1) Almost Never; (3) Neutral; (5) Almost Always.

1	Adequately completes assigned duties.	1 2 3 4 5
2	Fulfils responsibilities specified in job description.	1 2 3 4 5
3	Performs tasks that are expected of him/her.	1 2 3 4 5
4	Meets formal performance requirements of the job.	1 2 3 4 5

5	Engages in activities that will directly affect his/her performance evaluation.	1	2	3	4	5
6	Neglects aspects of the job he/she is obligated to perform. (R)	1	2	3	4	5
7	Fails to perform essential duties. (R)	1	2	3	4	5
8	Helps others who have been absent.	1	2	3	4	5
9	Helps others who have heavy workloads.	1	2	3	4	5
10	Assists supervisor with his/her work (when not asked).	1	2	3	4	5
11	Takes time to listen to co-workers' problems and worries.	1	2	3	4	5
12	Goes out of way to help new employees.	1	2	3	4	5
13	Takes a personal interest in other employees.	1	2	3	4	5
14	Passes along information to co-workers.	1	2	3	4	5
15	Attendance at work in above the norm.	1	2	3	4	5
16	Gives advance notice when unable to come to work.	1	2	3	4	5
17	Takes undeserved work breaks. (R)	1	2	3	4	5
18	Great deal of time spent with personal phone conversations. (R)	1	2	3	4	5
19	Complains about insignificant things at work. (R)	1	2	3	4	5
20	Conserves and protects organizational property.	1	2	3	4	5
21	Adheres to informal rules devised to maintain order.	1	2	3	4	5

'R' represents 'Reverse-coded'.

Part 5 Background Information

1) How long is the history of your company?

☐ ≤ 10 years ☐ 11-20 years ☐ 21-30 years ☐ 31-40 years ☐ > 40 years

2) Which grade of certificate does your company have?

☐ Premier Grade ☐ 1st Grade

3) Age of respondent

☐ 20-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ ≥ 60

4) How long have you been in this company?

☐ < 5 years ☐ 5-10 years ☐ 11-15 years ☐ 16-20 years ☐ > 20 years

5) What is your job title?

☐ Project manager ☐ Technical engineer ☐ Commercial staff ☐ Financial staff

6) Educational Level: ☐ Polytechnic/ Technical Institute's Degree

☐ Bachelor's degree ☐ Master's Degree ☐ PhD's Degree

-End-

If you want to have the result of this study, please write down your E-mail address hereunder:

If you have any questions or comments about this study or questionnaire, please feel free to write it down below.

Appendix II: Questionnaire scale – Chinese version

关于中国建筑企业人力资源管理的调查问卷

尊敬的女士/先生：

您好！我是英国拉夫堡大学(Loughborough University)建筑工程系的一名在读博士生，我的研究是关于中国国有建筑企业如何通过人力资源管理提高公司绩效，请您结合贵公司实际情况，填写以下问卷。**此问卷只用于学术研究，每一题的答案均无对错之分，您只需依据您的实际情况填写即可。**本次调查采用匿名形式，您所提供的信息将被严格保密。请将答完后的问卷用附件发到我的电子邮箱：xiaofeng.zhai@gmail.com 非常感谢您的参与。调研人：翟晓峰

请评价以下关于贵公司在员工管理及学习方面的描述，并打分。

1=非常不同意；2=有些不同意；3=基本同意；4=大部分同意；5=非常同意

我公司会尽可能招聘到合适的员工。	
我公司在选拔录用员工时更强调员工的长期潜能。	
我公司在招聘员工时，不但考虑员工的能力和工作经验，而且考虑他在工作中的合作能力以及学习的能力。	
需要招聘新员工的部门或项目组，会参与招聘过程。	
我公司向员工提供正式培训。	
我公司有全面的员工培训计划和方案。	
我公司有正式的员工培训计划，传授新聘员工完成其工作所需技能。	
我公司提供的培训可以提高员工解决问题的能力。	
在我公司，员工升迁机会很少。	
在我公司，员工升迁更多靠资历。	
员工在我公司有清晰的职业发展道路。	
员工只要自己愿意，就可以留在本公司。	
在我公司，员工的职业安全总是能够得到保证。	
我公司员工的业绩评定基于客观、量化的结果。	
我公司对员工的评价基于员工平时表现。	
我公司员工的工作评估强调长期性及团队成绩。	
我公司有灵活的工资系统：固定工资+奖金。	
我公司会根据项目或公司效益给员工发放奖金。	
我公司会根据个人的表现给些鼓励性的奖金。	
我公司对岗位职责有明确的界定。	
我公司会不断更新对岗位的描述。	
我公司的岗位职责描述中涵盖员工所有的工作职责。	
我公司的主管经常让员工参与决策。	
我公司会向员工传达公司经济和战略方向的信息。	
在我公司内，员工有机会提出建议来改进工作方式。	
在我公司内，主管与员工能开诚布公的进行交流。	
我公司鼓励员工参加培训来提高个人能力。	
我公司会通过部门内部或项目组内部的讨论来提高团队能力。	
我公司会组织会议或建立网络平台来共享个人的经验和知识。	
我公司会总结和学习完工项目的成功经验或失败教训。	
我公司会向合作单位（分包商或联营体）学习他们的长处。	
我公司会与大学合作或自行研究新的施工技术或施工材料。	
我公司会从咨询公司，竞争对手或业主方学习他们的经验和优点。	
我公司会根据项目运作环境或需求变化，调整自己的施工及管理方法。	
我公司会了解和学习建筑行业最新的发展方向，并制定应对措施。	
我公司建立了工作流程或项目管理方法的标准化文件。	
我公司建立了不同领域专家的名录，遇到具体问题便于查找、咨询。	

请您评价过去三年中贵公司在以下各方面的表现，并打分。

1=非常不好；2=不好；3=一般；4=比较好；5=非常好

年合同额增长率	
年收益率	
市场份额	
公司实现了自己的目标。	
公司利用最少的资源来达到自己的目标。	
公司通过增强自己的能力去迎接未来的机遇和挑战。	
业主对公司所承包项目的满意度。	
员工对公司的满意度。	
公司在施工技术和项目管理方面的创新。	
公司所承建项目的平均质量。	

您同意以下对您日常工作情况的描述吗？请打分。

1=非常不同意；2=有些不同意；3=基本同意；4=大部分同意；5=非常同意

我能按时完成布置的工作任务。	
我能履行员工守则中写明的责任。	
我能完成自己的份内工作。	
我的表现能满足工作要求。	
我喜欢参与那些有助于提高我的工作绩效的活动。	
我有时候会忽视本来有义务要去做的工作。	
我不需要承担任何工作上的责任。	
我常常帮助那些缺席的同事完成他们的工作。	
我常常帮助那些工作繁重的同事完成他们的工作。	
我会主动协助上司完成他（她）的工作。	
我常常抽时间倾听同事遇到的问题和担忧。	
我能够主动自觉地帮助新员工。	
我很关心公司的其他同事。	
我会将获得的信息告诉同事。	
我对待工作的积极性高于一般标准要求。	
当我不能去公司上班时，我会提前请假。	
我常常偷懒。	
我经常花大量的工作时间打私人电话。	
我对工作中无关重要的事情会经常抱怨。	
我注意节约和保护公司财产。	
我会遵守公司中的一些不成文的规章制度。	

背景资料

公司年龄：	公司施工资质：	您的学历：
您的年龄：	就职时间：	工作职能：

感谢您抽出时间参与调查。请您从头核对一下您已经对所有的问题给出答案。如果您对本次调查的结果感兴趣，请写下您的电邮：

Appendix III: Interview scale

Themes for interview

I am a research student at the Department of Civil and Building Engineering, Loughborough University. At present, I am conducting a research about the effects of organisational learning and individual behaviour on organisational performance. This research context is the Chinese construction SOEs with premier or 1st grade certificate, and the research intends to interview the employees in construction firms. Because interview data would provide firsthand information of the current employees' perception in the related research area in China's construction SOEs. Therefore, your experience and knowledge as a middle-level manager of a construction SOE would definitely contribute a lot to this research. The investigation and research result would be shared with you if you have interest.

The interview will be **kept strictly confidential** and will be available only to the researchers of this study. Excerpts of this interview may be made part of the final research report, but under no circumstances will your name or identifying characteristics be included in this report without your permission.

This interview will last one to one and a half hours. Thank you very much for your willingness to participate in this research.

Zhai Xiaofeng
Dept. of Civil and Building Engineering,
Loughborough University, U.K.,
LE11 3TU

The list of interview questions:

- (1) How does your company design the training program?
- (2) Were the training activities applicable for you? What kinds of training method and content do you think is applicable for your construction company?
- (3) Is there any procedure to evaluate training events that ensure transfer and application of newly acquired knowledge, skills and abilities (KSAs)?
- (4) What's the effect of training for you (e.g. improving your KSAs)? Do you apply the new acquired KSAs to your job? What constraints do you think affect the application of new acquired KSAs?
- (5) What kind of reward practices (intrinsic or extrinsic) does your company provide? What are the effects of these reward practices on you (e.g. do these reward practices motivate you to work harder)?
- (6) What conditions can attract you to quit the job and join another company?
- (7) When you have difficulties in fulfilling the responsibilities specified in your job description, how will you solve them?
- (8) Do you intend to perform some behaviour which goes beyond specified role requirement, like cooperative and helping behaviours? Why? What can elicit you to perform such extra-role behaviours?
- (9) If you perform extra-role behaviour (like helping your colleges, or providing suggestions for the project or the firm), in your opinion, what are the effects of such behaviours?
- (10) How does your individual performance contribute to organisational performance?
- (11) In your opinion, what are the effects of the knowledge sharing between you and your colleagues?
- (12) What are the factors that can influence the knowledge sharing between you and your colleagues?

Appendix IV-1: T-test for non-response bias

		N	Mean	Std. Deviation	Std. Error Mean	Levene's Test for Equality of Variances	
						F	Sig.
Staffing	Early Response	147	3.5986	.82010	.06764	.608	.436
	Late Response	179	3.4944	.77394	.05785		
Training	Early Response	147	3.1667	.95594	.07884	.130	.719
	Late Response	179	3.2933	.97108	.07258		
Mobility	Early Response	147	3.1315	.74796	.06169	.009	.926
	Late Response	179	3.0521	.77557	.05797		
Job Security	Early Response	147	3.4524	.84670	.06983	.821	.366
	Late Response	179	3.1732	.78121	.05839		
Appraisal	Early Response	147	3.0748	.74617	.06154	.316	.574
	Late Response	179	3.1918	.73001	.05456		
Rewards	Early Response	147	3.3197	.99609	.08216	.569	.451
	Late Response	179	3.3575	.97216	.07266		
Job Description	Early Response	147	3.0771	.86981	.07174	1.410	.236
	Late Response	179	3.0652	.81196	.06069		
Participation	Early Response	147	3.0442	.91772	.07569	2.413	.121
	Late Response	179	2.9665	.85476	.06389		
Organisational Learning	Early Response	147	3.2857	.82583	.06811	4.678	.031
	Late Response	179	3.3012	.71926	.05376		
Organisational Performance	Early Response	147	3.4966	.67676	.05582	3.662	.057
	Late Response	179	3.3492	.60702	.04537		
In-role Behaviour	Early Response	147	4.2468	.47983	.03958	1.982	.160
	Late Response	179	4.0223	.51370	.03840		
OCB	Early Response	147	3.8426	.48199	.03975	.036	.851
	Late Response	179	3.6672	.49638	.03710		

Appendix IV-2: Univariate Normality Test

	Mean	Std. Deviation	Skew		Kurtosis		Critical Ratio of Skew	Critical Ratio of Kurtosis
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error		
HR1	3.64	1.062	-.355	.135	-.446	.270	-2.62	-1.65
HR2	3.43	1.008	-.023	.135	-.808	.269	-0.17	-3.00
HR3	3.68	1.056	-.397	.135	-.559	.269	-2.94	-2.08
HR4	3.41	1.321	-.377	.135	-.987	.269	-2.79	-3.66
HR5	3.55	1.223	-.391	.135	-.845	.270	-2.89	-3.13
HR6	3.18	1.217	-.108	.135	-.938	.269	-0.80	-3.48
HR7	3.14	1.134	-.032	.135	-.726	.270	-0.24	-2.69
HR8	3.08	1.021	-.050	.135	-.476	.269	-0.37	-1.77
HR9	3.37	1.081	-.362	.135	-.571	.269	-2.68	-2.12
HR10	3.06	1.114	-.183	.135	-.686	.270	-1.36	-2.55
HR11	2.84	.999	.201	.135	-.387	.269	1.49	-1.44
HR12	3.12	1.202	-.076	.135	-.866	.269	-0.56	-3.22
HR13	3.48	.921	-.148	.135	-.417	.269	-1.10	-1.55
HR14	2.96	.984	.002	.135	-.376	.269	0.02	-1.40
HR15	3.28	.913	-.306	.135	.112	.269	-2.27	0.42
HR16	3.18	.993	-.161	.135	-.381	.269	-1.19	-1.41
HR17	3.54	1.214	-.476	.135	-.680	.269	-3.52	-2.52
HR18	3.52	1.133	-.373	.135	-.636	.269	-2.76	-2.36
HR19	2.96	1.247	.099	.135	-.858	.269	0.73	-3.19
HR20	3.28	1.066	-.186	.135	-.512	.269	-1.37	-1.90
HR21	2.83	.991	.204	.135	-.239	.269	1.51	-0.89
HR22	3.10	1.074	-.023	.135	-.594	.270	-0.17	-2.20
HR23	2.48	1.131	.546	.135	-.345	.269	4.04	-1.28
HR24	3.30	1.041	-.324	.135	-.412	.269	-2.40	-1.53
HR25	3.11	1.042	-.081	.135	-.360	.269	-0.60	-1.34
HR26	3.11	1.148	.016	.135	-.727	.269	0.12	-2.70
OL1	3.68	1.047	-.471	.135	-.341	.269	-3.49	-1.27
OL2	3.26	1.029	-.158	.135	-.357	.269	-1.17	-1.32
OL3	3.05	1.189	.038	.135	-.853	.269	0.28	-3.17
OL4	3.32	1.094	-.127	.135	-.548	.269	-0.94	-2.03
OL5	3.31	1.075	-.142	.135	-.582	.269	-1.05	-2.16
OL6	2.77	1.214	.086	.135	-.958	.270	0.64	-3.55
OL7	3.29	1.044	-.152	.135	-.515	.269	-1.13	-1.91
OL8	3.48	1.004	-.189	.135	-.417	.269	-1.40	-1.55
OL9	3.47	1.000	-.416	.135	-.060	.269	-3.08	-0.22
OL10	3.74	.994	-.420	.135	-.372	.270	-3.10	-1.38
OL11	2.87	1.198	.121	.135	-.869	.269	0.89	-3.23
OP1	3.66	.884	-.451	.135	.398	.270	-3.33	1.47
OP2	3.29	.908	-.293	.135	.342	.269	-2.17	1.27
OP3	3.40	.909	-.222	.135	-.034	.269	-1.64	-0.12
OP4	3.55	1.027	-.416	.135	-.381	.269	-3.08	-1.42
OP5	2.98	.990	-.052	.135	-.394	.269	-0.39	-1.46
OP6	3.44	.939	-.254	.135	-.079	.269	-1.88	-0.29

OP7	3.65	.849	-.448	.135	.074	.269	-3.32	0.27
OP8	3.22	.890	-.284	.135	.283	.269	-2.10	1.05
OP9	3.17	.874	-.258	.135	.063	.269	-1.91	0.23
OP10	3.79	.782	-.573	.135	.971	.269	-4.24	3.60
IB1	4.12	.770	-.454	.135	-.490	.270	-3.35	-1.82
IB2	4.10	.866	-.684	.135	-.273	.269	-5.06	-1.01
IB3	4.34	.759	-1.042	.135	.739	.269	-7.71	2.74
IB4	4.05	.808	-.506	.135	-.309	.269	-3.75	-1.15
IB5	4.13	.872	-.651	.135	-.231	.269	-4.82	-0.86
IB6	3.71	.959	-.511	.135	-.291	.269	-3.79	-1.08
IB7	4.42	.886	-1.855	.135	3.555	.269	-13.74	13.20
IB8	2.96	1.022	.017	.135	-.403	.269	0.12	-1.50
IB9	3.21	.988	.040	.135	-.502	.269	0.30	-1.87
IB10	3.44	1.079	-.477	.135	-.326	.269	-3.53	-1.21
IB11	3.50	.944	-.146	.135	-.326	.269	-1.08	-1.21
IB12	3.70	.933	-.321	.135	-.334	.269	-2.37	-1.24
IB13	3.32	.840	.040	.135	-.202	.270	0.29	-0.75
IB14	3.54	.879	-.044	.135	-.440	.269	-0.33	-1.63
IB15	3.79	.876	-.251	.135	-.542	.269	-1.86	-2.01
IB16	4.42	.851	-1.398	.135	1.401	.269	-10.35	5.20
IB17	4.27	.983	-1.516	.135	2.019	.269	-11.22	7.50
IB18	4.63	.696	-2.280	.135	6.017	.269	-16.88	22.34
IB19	4.04	1.013	-.944	.135	.262	.269	-6.99	0.97
IB20	3.97	1.009	-.903	.135	.520	.269	-6.69	1.93
IB21	3.67	1.110	-.758	.135	.125	.269	-5.61	0.46

Legends:

HR, human resource;

OL, organisational learning;

OP, organisational performance;

IB, individual behaviour.

Appendix IV-3: Exploratory factor analysis of HR practices Measurement Instrument

Correlation Matrix^a of Observed variables of Human Resource(HR) Practices

Correlation Coefficient																										
	HR1	HR2	HR3	HR4	HR5	HR6	HR7	HR8	HR9	HR10	HR11	HR12	HR13	HR14	HR15	HR16	HR17	HR18	HR19	HR20	HR21	HR22	HR23	HR24	HR25	HR26
HR1	1																									
HR2	0.47	1.00																								
HR3	0.49	0.61	1.00																							
HR4	0.44	0.33	0.47	1.00																						
HR5	0.27	0.35	0.34	0.28	1.00																					
HR6	0.32	0.39	0.38	0.38	0.68	1.00																				
HR7	0.35	0.46	0.37	0.34	0.68	0.70	1.00																			
HR8	0.36	0.51	0.52	0.29	0.55	0.54	0.60	1.00																		
HR9	0.11	0.24	0.25	0.19	0.24	0.23	0.35	0.35	1.00																	
HR10	0.11	0.03	0.03	0.04	0.12	0.02	0.02	0.03	0.30	1.00																
HR11	0.27	0.37	0.35	0.31	0.33	0.45	0.47	0.55	0.27	0.05	1.00															
HR12	0.13	0.08	0.06	0.25	0.10	0.27	0.18	0.03	0.12	-0.10	-0.09	1.00														
HR13	0.20	0.26	0.25	0.15	0.28	0.17	0.24	0.39	0.28	-0.08	0.33	0.25	1.00													
HR14	0.30	0.38	0.39	0.39	0.39	0.42	0.40	0.56	0.27	-0.19	0.52	-0.08	0.30	1.00												
HR15	0.37	0.35	0.43	0.31	0.30	0.34	0.38	0.38	0.33	-0.13	0.36	0.00	0.36	0.43	1.00											
HR16	0.34	0.51	0.54	0.35	0.37	0.45	0.44	0.52	0.40	-0.01	0.51	-0.23	0.37	0.62	0.50	1.00										
HR17	0.25	0.25	0.37	0.36	0.26	0.23	0.33	0.41	0.24	0.02	0.40	-0.16	0.30	0.35	0.34	0.44	1.00									
HR18	0.19	0.29	0.36	0.15	0.14	0.09	0.18	0.30	0.28	0.01	0.31	-0.06	0.25	0.31	0.25	0.43	0.56	1.00								
HR19	0.19	0.27	0.39	0.28	0.25	0.22	0.31	0.46	0.44	0.06	0.47	0.04	0.28	0.48	0.33	0.41	0.47	0.57	1.00							
HR20	0.24	0.38	0.34	0.29	0.44	0.47	0.44	0.47	0.27	-0.01	0.43	-0.10	0.29	0.51	0.42	0.49	0.25	0.25	0.32	1.00						
HR21	0.31	0.35	0.42	0.38	0.29	0.37	0.43	0.44	0.32	-0.01	0.44	-0.22	0.21	0.45	0.38	0.55	0.34	0.36	0.38	0.57	1.00					
HR22	0.21	0.31	0.30	0.33	0.41	0.47	0.58	0.46	0.25	-0.11	0.45	-0.23	0.28	0.44	0.44	0.53	0.41	0.25	0.22	0.59	0.61	1.00				
HR23	0.24	0.39	0.49	0.36	0.25	0.28	0.35	0.47	0.32	-0.01	0.45	-0.09	0.29	0.56	0.41	0.58	0.43	0.37	0.48	0.38	0.50	0.42	1.00			
HR24	0.33	0.32	0.50	0.44	0.33	0.37	0.41	0.39	0.32	0.04	0.41	0.01	0.32	0.48	0.39	0.46	0.23	0.27	0.43	0.47	0.38	0.35	0.51	1.00		
HR25	0.31	0.38	0.47	0.37	0.43	0.39	0.42	0.44	0.35	0.02	0.34	-0.02	0.38	0.46	0.42	0.51	0.37	0.38	0.42	0.55	0.40	0.40	0.57	0.57	1.00	
HR26	0.22	0.33	0.37	0.29	0.27	0.26	0.37	0.47	0.42	0.02	0.42	0.04	0.49	0.44	0.39	0.51	0.31	0.38	0.45	0.46	0.41	0.34	0.61	0.52	0.69	1
Significance (1-tailed)																										

	HR1	HR2	HR3	HR4	HR5	HR6	HR7	HR8	HR9	HR10	HR11	HR12	HR13	HR14	HR15	HR16	HR17	HR18	HR19	HR20	HR21	HR22	HR23	HR24	HR25	HR26
HR1																										
HR2	0.00																									
HR3	0.00	0.00																								
HR4	0.00	0.00	0.00																							
HR5	0.00	0.00	0.00	0.00																						
HR6	0.00	0.00	0.00	0.00	0.00																					
HR7	0.00	0.00	0.00	0.00	0.00	0.00																				
HR8	0.00	0.00	0.00	0.00	0.00	0.00	0.00																			
HR9	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00																		
HR10	0.09	0.34	0.33	0.29	0.06	0.40	0.39	0.37	0.00																	
HR11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26																
HR12	0.05	0.16	0.23	0.00	0.10	0.00	0.01	0.34	0.07	0.11	0.14															
HR13	0.01	0.00	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.17	0.00	0.00														
HR14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.16	0.00													
HR15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.48	0.00	0.00												
HR16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00											
HR17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.02	0.00	0.00	0.00	0.00										
HR18	0.01	0.00	0.00	0.03	0.03	0.13	0.01	0.00	0.00	0.46	0.00	0.21	0.00	0.00	0.00	0.00	0.00									
HR19	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00								
HR20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
HR21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
HR22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
HR23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
HR24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
HR25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
HR26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

a. Only cases for which First and Second Half = First Half are used in the analysis phase.

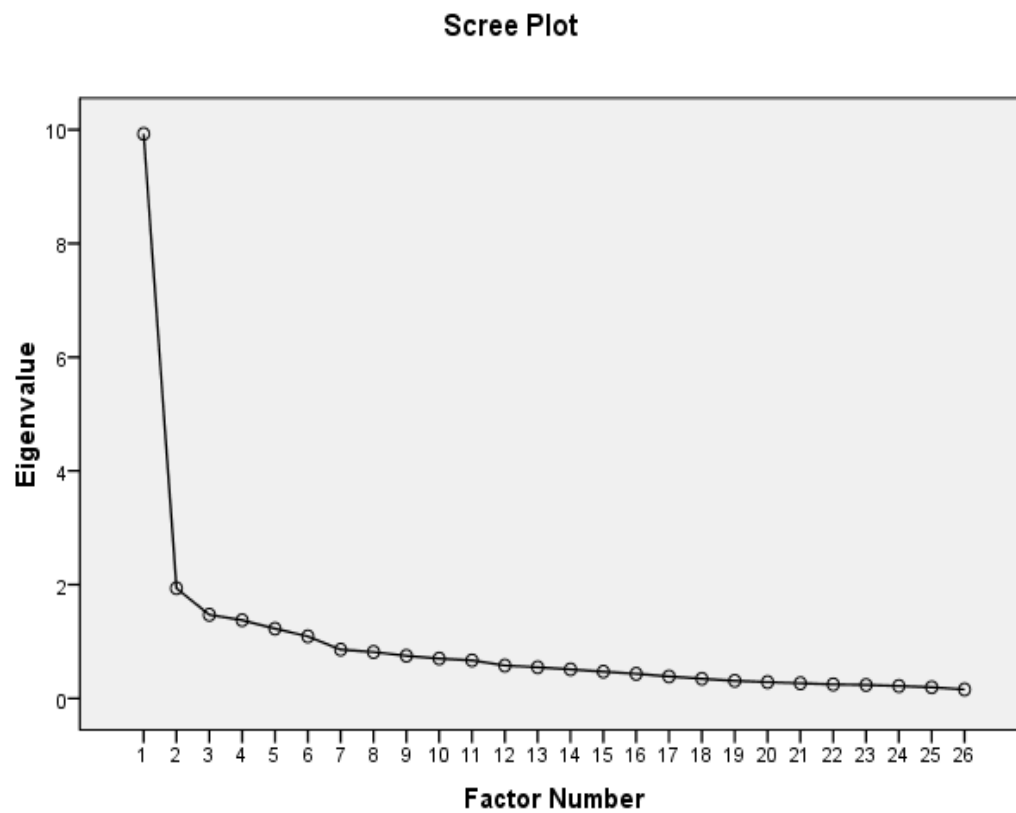
EFA of HR practices: Total Variance Explained^a

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.926	38.179	38.179	9.498	36.532	36.532	4.148	15.954	15.954
2	1.936	7.446	45.625	1.543	5.934	42.466	3.272	12.585	28.538
3	1.470	5.655	51.280	.965	3.713	46.179	2.549	9.803	38.342
4	1.375	5.288	56.568	.902	3.468	49.647	2.448	9.417	47.759
5	1.226	4.716	61.284	.773	2.973	52.620	1.064	4.091	51.849
6	1.091	4.197	65.481	.656	2.524	55.144	.857	3.295	55.144
7	.857	3.297	68.778						
8	.816	3.140	71.918						
9	.750	2.885	74.803						
10	.699	2.690	77.493						
11	.668	2.570	80.063						
12	.578	2.223	82.285						
13	.548	2.107	84.393						
14	.509	1.959	86.352						
15	.470	1.807	88.159						
16	.431	1.659	89.818						
17	.387	1.487	91.305						
18	.346	1.330	92.636						
19	.309	1.187	93.822						
20	.286	1.101	94.924						
21	.266	1.022	95.946						
22	.246	.947	96.893						
23	.237	.911	97.805						
24	.217	.837	98.641						
25	.196	.756	99.397						
26	.157	.603	100.000						

Extraction Method: Principal Axis factoring.

a. Only cases for which First and Second Half = First Half are used in the analysis phase.

EFA: exploratory factor analysis; HR: human resource



Scree Plot of Factors Retained of Human Resource Practices Instrument

HR Practices Instrument: Rotated Factor Matrix^{a,b}

	Factor					
	1	2	3	4	5	6
HR1	.125	.189	.100	.623	.057	-.104
HR2	.213	.308	.193	.550	-.012	.003
HR3	.266	.172	.258	.724	-.010	.083
HR4	.283	.163	.117	.486	.231	-.013
HR5	.182	.746	.072	.188	-.047	-.036
HR6	.204	.757	.004	.264	.194	.065
HR7	.250	.764	.141	.218	.100	.058
HR8	.298	.571	.351	.293	-.099	.058
HR9	.348	.205	.279	.058	.002	.433
HR10	-.030	-.036	.019	-.055	.099	.666
HR11	.355	.380	.376	.172	.048	.028
HR12	.022	-.119	-.042	-.100	-.670	-.111
HR13	.394	.201	.245	.095	-.366	-.053
HR14	.498	.308	.315	.253	.035	-.166
HR15	.429	.238	.220	.296	-.026	-.114
HR16	.516	.281	.379	.319	.167	-.001
HR17	.176	.168	.652	.184	.125	-.025
HR18	.214	-.008	.702	.146	-9.735E-5	.054
HR19	.319	.139	.622	.159	-.123	.178
HR20	.595	.388	.116	.118	.117	-.043
HR21	.513	.238	.294	.192	.322	-.039
HR22	.506	.453	.221	.027	.335	-.201
HR23	.582	.102	.360	.283	.046	.042
HR24	.569	.190	.114	.360	-.068	.126
HR25	.633	.227	.196	.286	-.106	.124
HR26	.702	.132	.256	.164	-.207	.165

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

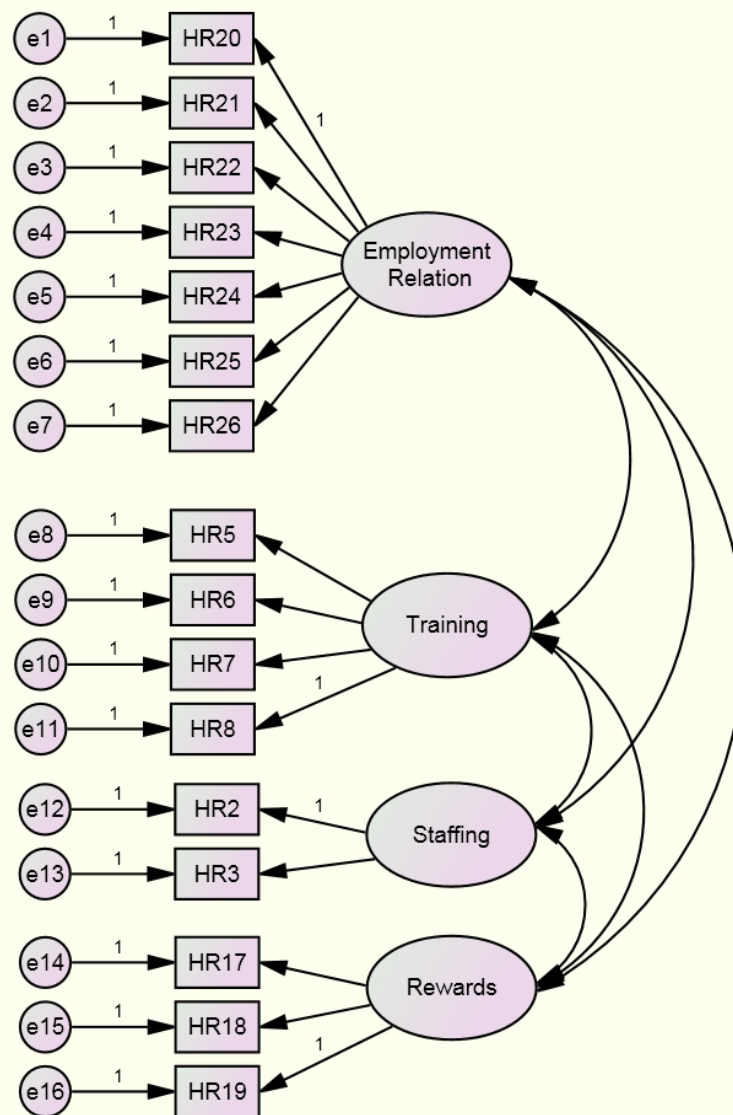
b. Only cases for which First and Second Half = First Half are used in the analysis phase.

Inter-Item Correlation Matrix of Staffing (HR practice)

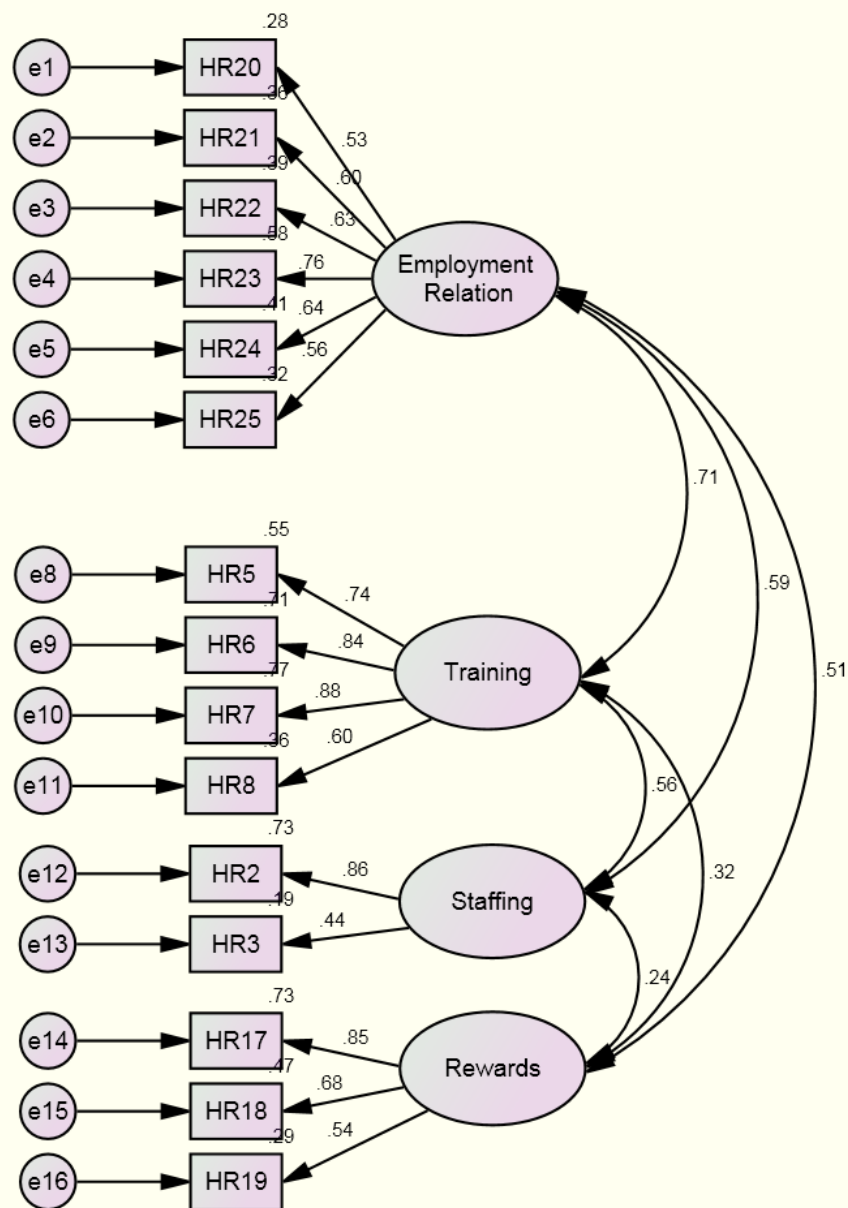
	HR1	HR2	HR3	HR4
HR1	1.000			
HR2	.292	1.000		
HR3	.426	.499	1.000	
HR4	.272	.278	.349	1.000

Legend: HR, human practice

Appendix IV-4: First-order HR practices measurement model



Initial first-order HR practices measurement model



Output standardised path diagram of the revised first-order HR practices measurement model.

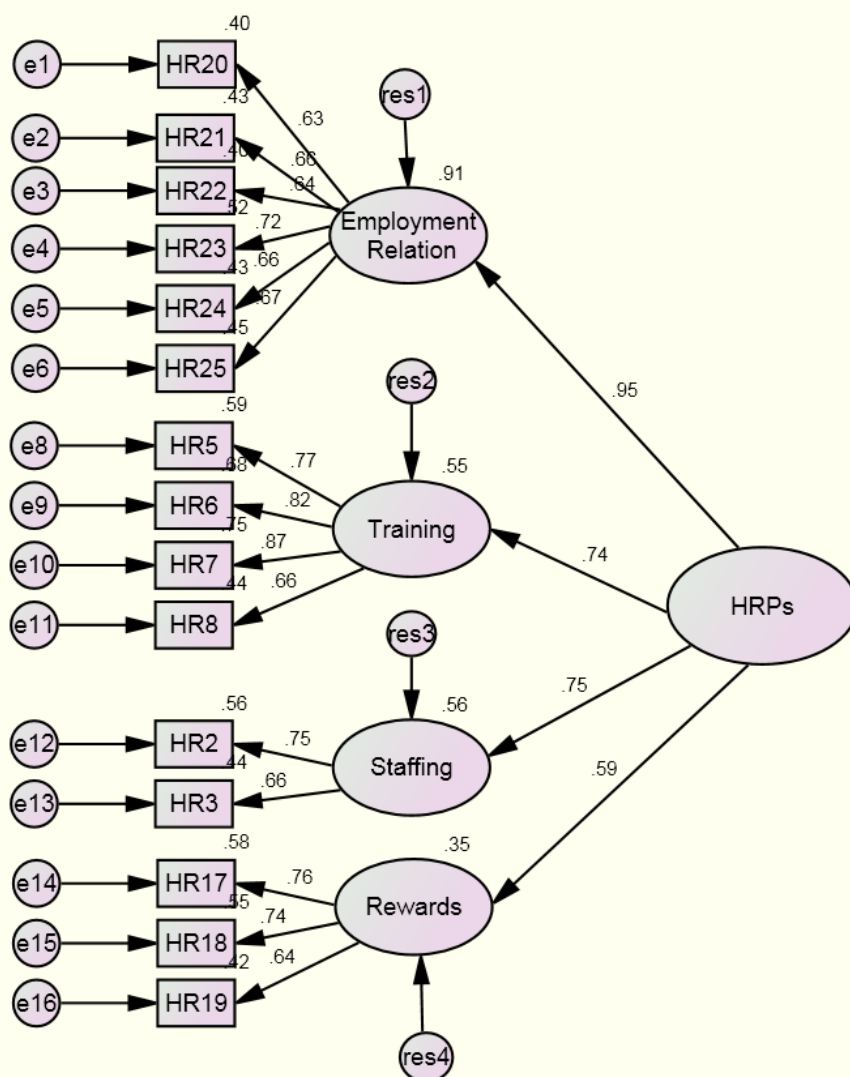
Detailed estimation of first-order HR practices measurement model (Maximum likelihood estimates)

Un-standardised Regression Weights:

	Estimate	S.E.	C.R.	P	Label
HR25 <--- Employment_ Relation	.940	.176	5.345	***	
HR24 <--- Employment_ Relation	1.172	.202	5.789	***	
HR23 <--- Employment_ Relation	1.543	.243	6.339	***	
HR22 <--- Employment_ Relation	1.263	.222	5.700	***	
HR21 <--- Employment_ Relation	.999	.180	5.543	***	
HR20 <--- Employment_ Relation	1.000				
HR5 <--- Training	1.383	.185	7.453	***	
HR6 <--- Training	1.576	.195	8.061	***	
HR7 <--- Training	1.576	.192	8.210	***	
HR8 <--- Training	1.000				
HR2 <--- Staffing	1.000				
HR3 <--- Staffing	.557	.159	3.514	***	
HR17 <--- Rewards	1.615	.280	5.776	***	
HR19 <--- Rewards	1.000				
HR18 <--- Rewards	1.220	.209	5.831	***	

Standardised Regression Weights

	Estimate
HR25 <--- Employment_ Relation	.564
HR24 <--- Employment_ Relation	.642
HR23 <--- Employment_ Relation	.763
HR22 <--- Employment_ Relation	.625
HR21 <--- Employment_ Relation	.597
HR20 <--- Employment_ Relation	.533
HR5 <--- Training	.745
HR6 <--- Training	.844
HR7 <--- Training	.877
HR8 <--- Training	.604
HR2 <--- Staffing	.857
HR3 <--- Staffing	.437
HR17 <--- Rewards	.852
HR19 <--- Rewards	.540
HR18 <--- Rewards	.685



Output standardised path diagram of the second-order HR practices measurement model.

Estimates of second-order HR practices measurement model (Maximum likelihood estimates)

Un-standardised Regression Weights:

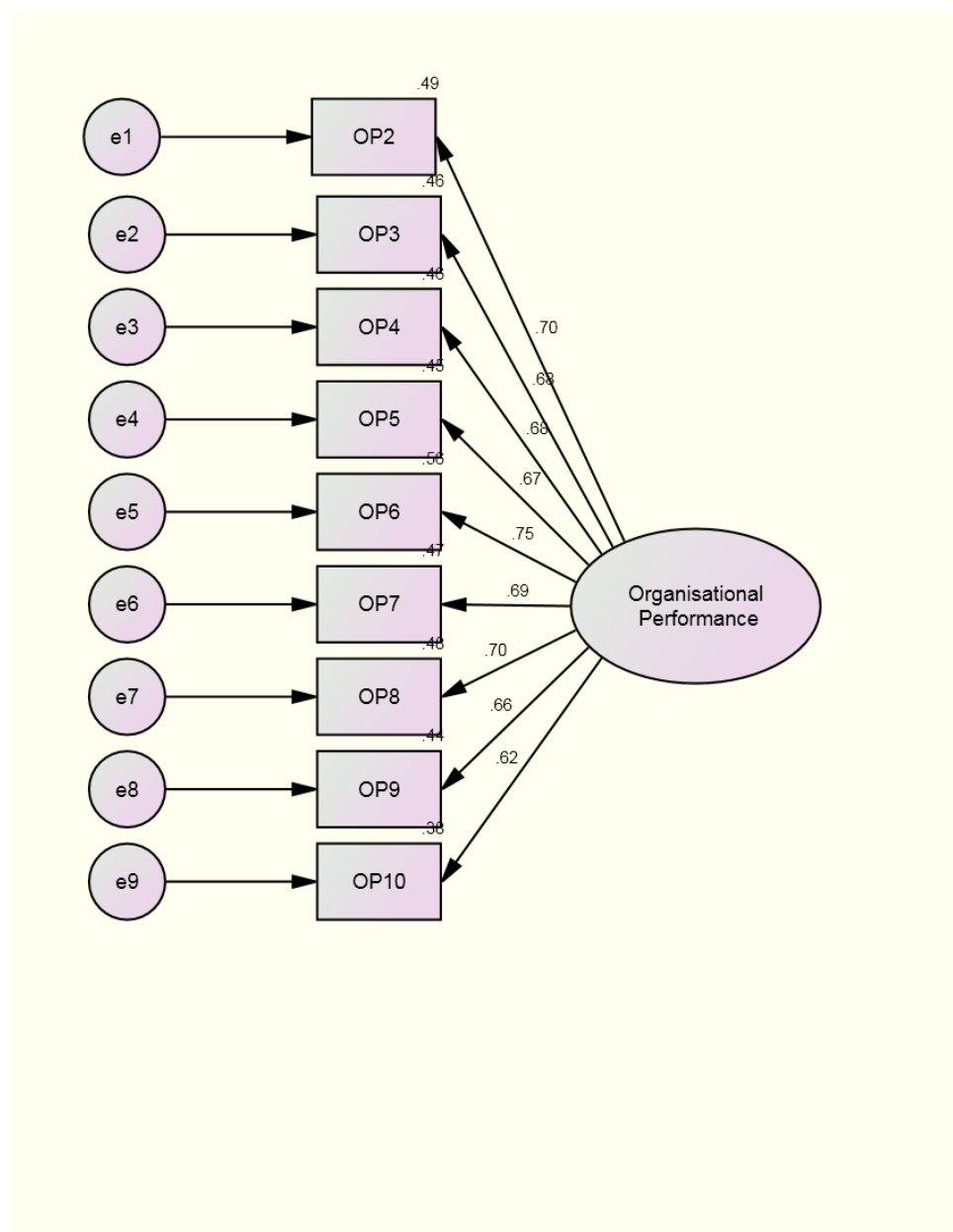
	Estimate	S.E.	C.R.	P	Label
Employment_ Relation <--- HRPs	.662	.058	11.434	***	par_11
Training <--- HRPs	.501	.051	9.858	***	par_12
Staffing <--- HRPs	.564	.057	9.893	***	par_13
Rewards <--- HRPs	.477	.062	7.641	***	par_14
HR25 <--- Employment_ Relation	1.000				
HR24 <--- Employment_ Relation	.981	.096	10.228	***	par_1
HR23 <--- Employment_ Relation	1.166	.106	11.027	***	par_2
HR21 <--- Employment_ Relation	.933	.091	10.222	***	par_3
HR20 <--- Employment_ Relation	.962	.098	9.856	***	par_4
HR5 <--- Training	1.388	.117	11.875	***	par_5
HR6 <--- Training	1.484	.118	12.533	***	par_6
HR7 <--- Training	1.455	.112	12.967	***	par_7
HR8 <--- Training	1.000				
HR2 <--- Staffing	1.000				
HR3 <--- Staffing	.927	.109	8.477	***	par_8
HR17 <--- Rewards	1.146	.118	9.723	***	par_9
HR19 <--- Rewards	1.000				
HR18 <--- Rewards	1.044	.108	9.665	***	par_10
HR22 <--- Employment_ Relation	.979	.098	9.949	***	par_15

Note: P-Value is significant at $P < 0.05$, ***, $P < 0.001$

Standardised Regression Weights:

	Estimate
Employment_ Relation <--- HRPs	.952
Training <--- HRPs	.742
Staffing <--- HRPs	.746
Rewards <--- HRPs	.594
HR25 <--- Employment_ Relation	.669
HR24 <--- Employment_ Relation	.657
HR23 <--- Employment_ Relation	.719
HR21 <--- Employment_ Relation	.656
HR20 <--- Employment_ Relation	.629
HR5 <--- Training	.768
HR6 <--- Training	.824
HR7 <--- Training	.868
HR8 <--- Training	.662
HR2 <--- Staffing	.751
HR3 <--- Staffing	.664
HR17 <--- Rewards	.758
HR19 <--- Rewards	.644
HR18 <--- Rewards	.740
HR22 <--- Employment_ Relation	.636

Appendix IV-6: Organisational performance measurement model (original version)



The standardised estimation of organisational performance measurement model (original version).