TOWARDS A DEEPER UNDERSTANDING OF THE COMPLEX RELATIONSHIPS BETWEEN KNOWLEDGE MANAGEMENT PRACTICES AND ORGANISATIONAL PERFORMANCE: A META-ANALYTIC STUDY

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CERTIFICATE OF ORIGINALITY

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Abstract

There has been a wealth of empirical research that has tried to examine the causal relationships between knowledge management (KM) and organisational performance, however, the findings of these studies have been mixed and at times contradictory. Such contradictions hinder theoretical development of KM due to a lack of generalisability. On the other hand, KM are socially embedded activities which are affected by the social and industrial environment. However, the contextual impacts on the KM-organisational performance relationships have been understudied. To address these knowledge gaps, this study aims to 1) investigate the relationships between KM practices and organisational performance; 2) identify whether contextual factors, such as the national culture, the economy, and the particular industry influence the relationships between KM practices and organisational performance. A meta-analysis approach was adopted to achieve these objectives.

Bivariate meta-analytic results indicated that knowledge-friendly organisational culture (KFOC), knowledge-based leadership, KM-supportive information technologies (IT), and organisational learning were positively associated with organisational performance (overall organisational performance, financial performance, and non-financial performance) while strategic KM was positively related to financial performance. In addition, the knowledge codification strategy was positively associated with overall organisational performance and financial performance, whereas the knowledge personalisation strategy was positively related to the overall organisational performance. Moderating effect analysis indicated that some dimensions of national culture, national economy, and industry type moderated some KM practices-organisational performance relationships.

The primary originality of this study is that this is the first meta-analytic study focusing on evaluating relationships between KM practices and organisational performance. It provides clear-cut empirical evidence of the positive impacts of KM practices on organisational performance with a large volume dataset. This study also improves the generalisability of KM practices-organisational performance relationships by reducing the heterogeneities raised from individual studies. Furthermore, this is also one of very few studies that has examined the role of national culture, economy, and industry type on the KM practices-organisational performance relationships and has confirmed their influence. The strength of this study is that it represents a comprehensive examination of the whole picture of KM practices-organisational performance relationships and the contextual factors surrounding them, which together provides a whole new understanding of KM and organisational performance in the management literature.

Keywords: knowledge management practices, organisational culture, leadership, strategic knowledge management, knowledge strategy, information technology, organisational learning, organisational performance, national culture, economy, industry, meta-analysis, literature review

Abbreviations

FP: financial performance

FM: masculinity versus femininity

IC: individualism versus collectivism

ins: insignificant

IR: indulgence- versus restraint-orientation

KBL: knowledge-based leadership

KFOC: knowledge-friendly organisational culture

KCS: knowledge codification strategy

KPS: knowledge personalisation strategy

KM: knowledge management

KMSIT/ KM-supportive IT: knowledge management-supportive information technologies

LS: long-versus short-term orientation

NA: not applicable

NFP: non-financial performance

OL: organisational learning

OOP: overall organisational performance

PD: power distance

RBV: resource-based view

R: rejected

SKM: strategic knowledge management

SME: small- and medium-sized enterprise

S: supported

UA: uncertainty avoidance

UK: unknown

Publications

Publications arising from this study

Liu, G., Tsui, E. and Kianto, A., (2021), "Knowledge-friendly organisational culture and performance: A meta-analysis", *Manuscript under review*.

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Liu, G., Tsui, E. and Kianto, A., (2021), "A synthesis of organisational learning and organisational performance: An explorative meta-analysis study", Manuscript in preparation.

Liu, G., Tsui, E. and Kianto, A., (2021), "Knowledge management strategies and organisational performance: A meta-analytical study", *Manuscript under review.*

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Liu, G., Tsui, E. and Kianto, A., (2021), "How knowledge management differs across national cultures: A systematic literature review", *Manuscript under review*.

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Chinese firms", de Pablos, P. O. and Edvinsson, L. (Ed.), *Intellectual Capital in the Digital Economy*, Routledge, London, UK, pp.62-73.

Liu, G., Tsui, E. and Kianto, A., (2018), "The myth of the presence of chief knowledge officers", in Bolisani, E., Maria, E. D. and Scarso, E. (Ed.), *European Conference on Knowledge Management*, 6 – 7 September 2018, Padua, Italy., pp. 1058-1063.

Liu, G., Tsui, E. and See-To, E., (2017), "Flourish or perish: An empirical study of the telecommunication equipment vendors from an IC perspective", in Tomé, E., Neumann, G. and Knežević, B. (Ed.), *Theory and Applications in the Knowledge Economy Conference (TAKE)*, 12-14th July 2017, Zagreb, Croatia, pp. 529-544.

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Table of Contents

List of Tables

List of Figures

Chapter 1 Introduction

This introductory chapter offers an overview of the thesis and presents the importance of knowledge management (KM) on organisational performance. Two major issues have been identified that have influenced current understanding of KM-organisational performance relationships. The research questions are proposed as an attempt to deal with the major issues identified. The significance of this study is then discussed, and the structure of the thesis is introduced at the end of this chapter.

1.1 Background

KM can be dated back to thousands of years ago when our ancestors tried to codify their ideas into explicit forms with different methods (Ives *et al*., 1998), however, it was in the late of last century that people realised the importance of KM. The awareness of knowledge and its management for improving firms' prosperity has been rising rapidly since the 1970s (Wiig, 1997) because the knowledge, as a prominent resource (Barney, 1991, 1996; Corsino *et al.*, 2019; Grant, 1996b; Zack, 1999) of organisations is the source of competitive advantages (Ferreira *et al.*, 2018; Liu *et al.*, 2020).

It is of broad consent that successful KM (Davenport *et al.*, 1998) can bring benefits to firms (Gupta and Chopra, 2018; Tsui, 2016) and the success of the firms depends on the capability of the firms in regard to knowledge creation (Kneeland *et al.*, 2020) and application (Nonaka and Takeuchi, 1995). Investigations on the relationships between KM and organisational performance are popular topics in both academia (Inkinen, 2016) and among KM practitioners (Heisig *et al.*, 2016) because KM is generally seen as a factor strongly related to organisational performance (Gupta and Chopra, 2018).

These studies advance KM theory and provide support for organisations which seek to deploy KM programmes to improve their performance.

Numerous scholarly works have explored the relationship between KM and organisational performance. These studies can be classified into two main streams, namely, relationships between KM practices and organisational performance; relationships between knowledge processes (such as knowledge sharing, transferring, creation, application, protection, etc.) and organisational performance (Inkinen, 2016), however, these two streams are interwoven in some cases, e.g. Oufkir and Kassou (2019), Lee *et al.* (2012) and Collins and Smith (2006). This study primarily focuses on the relationships between KM practices and organisational performance because KM practices are embedded in the daily management and operation of the organisations and these KM practices can be easily understood by practitioners.

According to Heisig (2009) and Inkinen (2016), there are four main categories of KM practices. These categories are human-oriented KM practices portrayed by culture, people, and leadership, technology-oriented KM practices characterized by KM infrastructure and applications, organisation-oriented KM practices represented by organisational processes and structures, and management process-oriented KM practices reflected by KM strategies, goals, and measurement. This study complies with this framework and links these factors with organisational performance to formulate a holistic research framework.

On the other hand, KM practices are varied due to regional idiosyncrasies (Hussinki *et al.*, 2017) and environment heterogeneities (Domenech *et al.*, 2016). The contexts are contingent factors that affect KM practices and moderate the relationship between KM practices and their outcomes. Contextual factors, such as national cultures might have

an impact on KM behaviour (King, 2007). For instance, knowledge sharing (Sadighi *et al.*, 2016) and learning (Furner *et al.*, 2009) have been demonstrated to be affected by national culture. Economies are also likely to configure knowledge resources by applying distinctive KM practices which result in peculiarities in KM across countries (Hussinki *et al*., 2017). KM is popular at present so that many firms in many industries have KM programmes. The variations of KM practices might be reflected by the diversity of the industries. To date, the vast majority of researchers have not considered the moderating effects of such contextual factors, namely national culture, economy, and industry on the KM-organisational performance relationships. Therefore, research into relationships between KM and organisational performance as well as the impacts of contextual factors on these relationships is interesting and needed.

1.2 Research motivation

Science is cooperative and accumulative in nature (Cooper, 2017). To contribute to our understanding of KM, researchers are eager to show what is already known by conducting literature reviews on KM research. For instance, previous review studies have revisited different aspects of KM (Inkinen, 2016), such as research productivity and journal rankings in KM area (Serenko and Bontis, 2004, 2017), KM theoretical development (Tzortzaki and Mihiotis, 2014), organisational culture in KM research (Mueller, 2012), KM frameworks for KM activities and enablers (Heisig, 2009), KM literature in franchising (Iddy and Alon, 2019), KM research gaps in small and medium sizes enterprises (Cerchione *et al.*, 2016; Durst and Edvardsson, 2012), in supply chain management (Cerchione and Esposito, 2016), and in the public sector (Massaro *et al.*, 2015) as well as the communities of practice (Bolisani and Scarso, 2014).

In addition, the earlier empirical studies linking KM and organisational performance were reviewed by Inkinen (2016) as well as Gupta and Chopra (2018) in systematic review approaches. Even though such systematic reviews can provide a general overview of previous empirical studies and identify some key contributions (Tranfield *et al.*, 2003) on KM and organisational performance, they still put into question the results of the KM-organisational performance relationship. These literature reviews cannot provide a comprehensive effect size between KM practices and organisational performance which thwarts the findings of reliable accumulative knowledge from a range of studies. Therefore, the relationships between the KM practices and organisational performance remains vague from the current review studies because they failed to assess the overall associations and resolve the contradictions between KM and organisational performance, which implies that readers still do not know for certainty whether KM is related to the organisational performance from their papers. To sum up, none of the present studies has adopted a meta-analytic approach to examine the KM-organisational performance relationships. It is crucial to investigate the KM-organisational performance relationships in a meta-analysis approach because meta-analysis can create new understanding of the specific magnitude of the causal relationships by reducing heterogeneity that emerged from the inconsistency of the relationships.

Besides the lack of synthesising studies concerning KM-organisational performance relationships, it is also found that the existing literature has realised the role of institutional contexts (Hussinki *et al*., 2017) in KM research. Given that social and regional factors might impact upon KM practices (Hussinki *et al.*, 2017), it is essential to figure out the effects of the contextual factors, such as national culture, economy, and industry on the KM practices-organisational performance. Most of the current

empirical studies on KM practices and organisational performance carried out surveys in a limited number of areas, thus, the generalisability of the findings seems uncertain to match other economic and social contexts (Gupta and Chopra, 2018). In addition, the studies of both Inkinen (2016) and Gupta and Chopra (2018) neglected the ramifications of contextual factors on the relationships between KM and organisational performance. Current review studies fail to explain the potential impacts of the contextual factors on the KM practices-organisational performance relationships. Therefore, a glaring omission is the lack of understanding regarding the effects of contextual factors, such as national culture, economy, and industry on the relationships between KM practices and organisational performance.

1.3 Problem statement

Existing scholarly works have recognized the critical role played by KM to organisational performance (Gupta and Chopra, 2018; Inkinen, 2016) because numerous studies explored the relationship between KM and organisational performance, but without reaching a consensus on KM-organisational performance relationships. For instance, Cheng *et al.* (2008) pointed out that the trust dimension of the knowledge-friendly organisational culture (KFOC) could not affect organisational performance directly. In contrast, Chen *et al.* (2011) argued that the trust culture of firms positively impacted on organisational performance. Inkinen and Kianto (2014) reported that knowledge-based leadership did not influence the market performance of Finnish firms while others showed contradicted results (Mageswari *et al.*, 2017; Noruzy *et al.*, 2013). In addition, Lee and Choi (2010) found that the relationship between strategic KM and financial performance was insignificant, but Valdez-Juárez *et al.* (2016) and Claver-Cortés *et al.* (2018) claimed strategic KM positively affected the

financial performance of firms. Both significant (Cohen and Olsen, 2015) and insignificant (Ling, 2013) relationships between KM strategies and the financial performance of firms were revealed as well. Khan *et al.* (2015) reported that the organisational learning-organisational performance relationship was insignificant while Noruzy *et al.* (2013) provided a significant relationship between organisational learning and organisational performance. Finally, a negative relationship between KM supportive information technologies (IT) and financial performance was disclosed by Shih *et al.* (2009), but others showed a positive relationship between KM-supportive IT and the financial performance of firms (Roldán *et al.*, 2014; Valdez-Juárez *et al.*, 2018).

To summarise, contradictions can be found from most of the relationships between different KM practices and organisational performance. Thus, the overall generalisability of the KM practices-organisational performance relationships from these inconsistent empirical findings is somewhat unconvincing. These equivocal findings may confuse KM learners and practitioners and thus deserve further exploration. In addition, significant empirical findings from individual studies may not be generalisable to a broader range of the population in other economic and social contexts (Gupta and Chopra, 2018). Finally, KM activities in organisations are socially embedded (Hussinki *et al.*, 2017), but the effects of contingent contextual factors, such as national culture, economy, and industry on KM, which might influence KM-organisational performance relationships, are still poorly understood.

The meta-analytic technique is employed in this study to address the above-mentioned problems raised from the studies of KM-organisational performance relationships because the meta-analysis approach provides a synthesised analysis of numerous empirical results from individual studies so as to integrate findings (Hartung *et al.*, 2008) by correcting any errors and biases of the quantitative studies (Schmidt and

Hunter, 2015). Using the meta-analysis approach, not only can this study evaluate the overall effect sizes between KM practices and organisational performance but also it can estimate the moderating effects of national culture, economy, and industry on the KM practices-organisational performance relationships and thus fill the research gaps on the importance of contexts in KM research which previous studies paid scant attention to.

1.4 Research questions

There are two primary objectives of this study: 1) To clarify the KM practices-organisational performance relationships using a holistic approach; 2) To ascertain whether the contextual factors exert an impact on the KM practices-organisational performance relationships. The two major problems discussed in the prior section identify the necessity of synthesising the previous studies of KM-organisational performance relationships as well as testing the impacts of national culture, economy, and industry on the KM-organisational performance relationships. To address these issues, this study adopts a meta-analysis approach to explore new knowledge from the existing relationships between KM practices and organisational performance and offers valuable insights into the effects of contextual factors in KM.

This study mainly focuses on investigating the KM-organisational performance relationships using a meta-analysis method and evaluating the moderating effects of contextual factors. Research questions are stated as follows:

Research question 1: What is the relationship between KM practices (e.g., KFOC, knowledge-based leadership, knowledge codification and personalisation strategy, strategic KM, KM-supportive IT, and organisational learning), and organisational performance (e.g., overall organisational performance, financial performance, and non-

financial performance)? To be specific, to what extent are the KM practices related to organisational performance based on accumulating empirical evidence? There are six sub-questions, as shown in Figure 1-1, from research question 1.1 to research question 1.6, as followed later in this section.

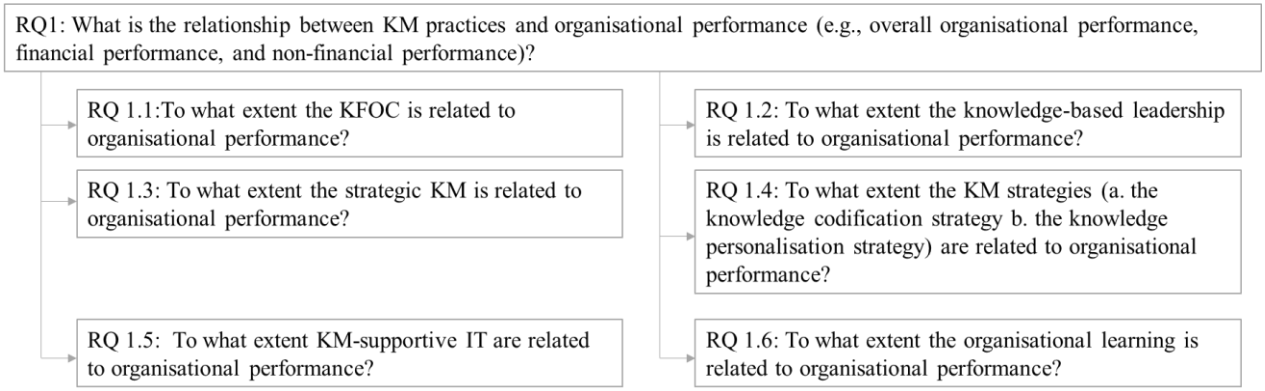


Figure 1-1: Research question 1

Research question 2: Do the contextual factors, such as national culture, economy, and industry moderate the KM practices-organisational performance relationships? To be specific, research question 2.1: Does national culture moderate the KM practices-organisational performance relationships? Research question 2.2: Does national economy moderate the KM practices-organisational performance relationships? Question 2.3: Does the type of industry moderate the KM practices-organisational performance relationships? As shown in Figure 1-2, there are six sub-questions as shown from research question 2.1.1 to research question 2.1.6, research question 2.2.1 to research question 2.2.6, and research question 2.3.1 to research question 2.3.6, for each contextual factor as follows.

The sub-questions of the Research Question 1 and Research Question 2 are categorised into six groups in order to clearly answer these questions in Chapter Six, as shown below.

- Research question group I: KFOC related

- *Research question 1.1: To what extent is the KFOC related to organisational performance (overall organisational performance, financial performance, and non-financial performance)?*
- *Research question 2.1.1: Does national culture moderate the KFOC-organisational performance relationships?*
- *Research question 2.2.1: Does national economy moderate the KFOC-organisational performance relationships?*
- *Research question 2.3.1: Does the type of industry moderate the KFOC-organisational performance relationships?*

- Research question group II: Knowledge-based leadership related

  - *Research question 1.2: To what extent is knowledge-based leadership related to organisational performance (overall organisational performance, financial performance, and non-financial performance)?*
  - *Research question 2.1.2: Does national culture moderate the knowledge-based leadership-organisational performance relationships?*
  - *Research question 2.2.2: Does national economy moderate the knowledge-based leadership-organisational performance relationships?*
  - *Research question 2.3.2: Does the type of industry moderate the knowledge-based leadership-organisational performance relationships?*

- Research question group III: Strategic KM related

  - *Research question 1.3: To what extent is strategic KM related to organisational performance (overall organisational performance, financial performance, and non-financial performance)?*

- *Research question 2.1.3: Does national culture moderate the strategic KM-organisational performance relationships?*
- *Research question 2.2.3: Does national economy moderate on the strategic KM-organisational performance relationships?*
- *Research question 2.3.3: Does the type of industry moderate the strategic KM-organisational performance relationships?*

- Research question group IV: KM strategies related

  - *Research question 1.4: To what extent the KM strategies (the knowledge codification strategy/ the knowledge personalisation strategy) are related to organisational performance (overall organisational performance, financial performance, and non-financial performance)?*
  - *Research question 2.1.4: Does national culture moderate the knowledge codification/ personalisation strategy-organisational performance relationships?*
  - *Research question 2.2.4: Does national economy moderate the knowledge codification/ personalisation strategy-organisational performance relationships?*
  - *Research question 2.3.4: Does the type of industry moderate the knowledge codification/ personalisation strategy-organisational performance relationships?*

- Research question group V: KM-supportive IT related

- *Research question 1.5: To what extent are KM-supportive IT related to organisational performance (overall organisational performance, financial performance, and non-financial performance)?*
- *Research question 2.1.5: Does national culture moderate the KM-supportive IT-organisational performance relationships?*
- *Research question 2.2.5: Does national economy moderate the KM-supportive IT-organisational performance relationships?*
- *Research question 2.3.5: Does the type of industry moderate the KM-supportive IT-organisational performance relationships?*

- Research question group VI: Organisational learning related

  - *Research question 1.6: To what extent is the organisational learning related to organisational performance (overall organisational performance, financial performance, and non-financial performance)?*
  - *Research question 2.1.6: Does national culture moderate the organisational learning-organisational performance relationships?*
  - *Research question 2.2.6: Does national economy moderate the organisational learning-organisational performance relationships?*
  - *Research question 2.3.6: Does the type of industry moderate the organisational learning-organisational performance relationships?*

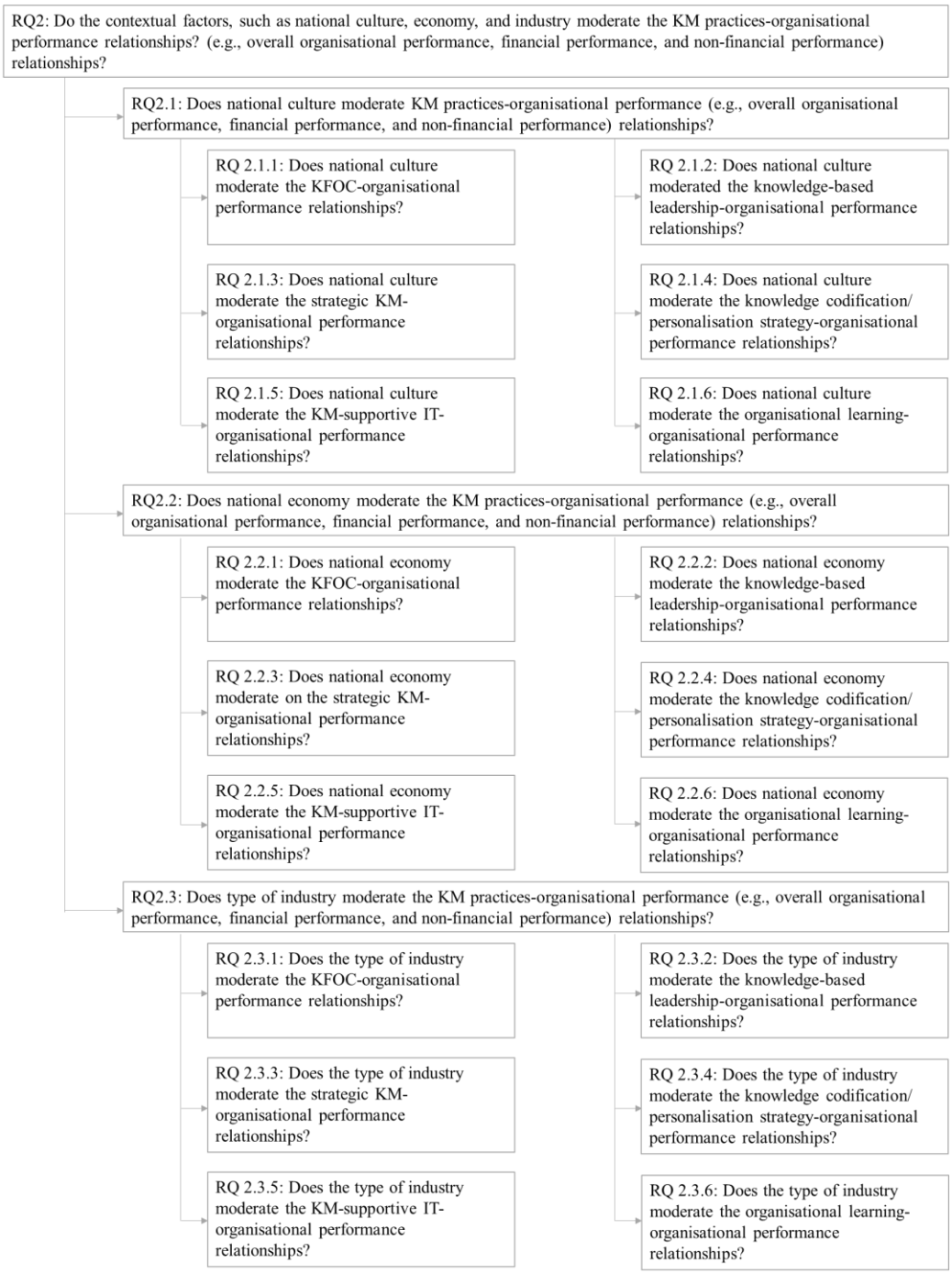


Figure 1-2: Research question 2

1.5 Significance of the study

Despite the large number of studies that have examined the relationship between KM and organisational performance, understanding of KM on organisational performance remains superficial. This study hitherto is the first integrative meta-analytic study that thoroughly examines KM practices-organisational performance relationships and

explores the impacts of contextual factors on these relationships in the KM research field, demonstrating a holistic picture for the relationship between KM practices and organisational performance. The importance and originality of this study are that it collates and synthesises the complex KM practices-organisational performance relationships. It confirms the positive impacts of KM practices on organisational performance based on a wealth of empirical evidence. This new knowledge that has emerged from this study helps to reduce the disputes and heterogeneities in KM practices-organisational performance literature and contributes to a deeper understanding towards KM and organisational performance, which advances our knowledge of KM practices and their benefits and improves the generalisability of the KM practices-organisational performance relationships literature. The present study, for the first time, investigates the role of national culture and economy on the KM practices-organisational performance relationships. The findings make important contributions to international business research by providing additional evidence on the effects of regional factors: national culture and economy on KM-organisational performance relationships. This study also sheds new light on the impacts of industries on KM practices-organisational performance relationships. The findings of the effects of contextual factors on KM practices-organisational performance relationships deepen our understanding of the role of contextual factors in affecting KM. This study has identified knowledge gaps that worth further exploring. This study can also help KM practitioners to better understand and apply KM practices in different contexts.

1.6 Structure of the thesis

There are six chapters in this thesis. Chapter one, the present chapter, outlines the background, research motivation, problems, research questions, significance and

organisations. Chapter two starts with an introduction to knowledge and KM practices and then discusses the relationships between KM practices and organisational performance; a comprehensive research model with hypotheses is demonstrated after critically examining previous studies. The methodology and research procedures of the study are delineated in Chapter three and Chapter four, respectively. Chapter five presents detailed data analysis and empirical results. Research findings, theoretical contributions, managerial implications, limitations, and future research are described in Chapter six.

Chapter 2 Literature review

Chapter One gives an overview of this thesis. In this chapter, a theoretical foundation, including basic concepts of knowledge, knowledge-based view, KM practices, and KM in different backgrounds, are introduced in the first section; Six research models concerning the KM practices-organisational performance relationships and the effects of contextual factors on these relationships are discussed in section two. A summary is presented at the end of this chapter.

2.1 Theoretical foundation

2.1.1 Concepts of knowledge

In the KM literature, knowledge has been conceptualized and defined in many different ways, which has given rise to considerable controversies within the field (Feraru, 2009), but these concepts can be summarised as the following aspects (Alavi and Leidner, 2001; Hemsley and Mason, 2013), DIKW (data, information, knowledge, and wisdom) pyramid, a state of mind, an object, a process, access to information, a capability, a field, as well as a resource.

One of the definitions of knowledge originates from the DIKW pyramid proposed by Ackoff (1989). From this viewpoint, knowledge is ‘personalised information’ (Alavi and Leidner, 2001, p.111) and is created from the factors (information and data) in sensing environments (Hemsley and Mason, 2013) for a given application (Zawila-Niedzwiecki, 2015). Wisdom then accumulates when the right knowledge solves complex problems (Hemsley and Mason, 2013). Snowden argued that DIKW was flawed in terms of ontology and epistemology due to the failure of complying with modern cognitive neuroscience (Bennet and Bennet, 2014, p.27).

Besides arguments regarding the DIKW hierarchy, knowledge can also be defined as a state of mind (what employees know) (Bollinger and Smith, 2001; Stevens *et al*., 2010), which emphasises applying individual knowledge to cater for an organisation's requirements (Alavi and Leidner, 2001). Knowledge is also considered as an object or organised body (Blanchard and Thacker, 2009) that can be stored and manipulated (Alavi and Leidner, 2001) for employees to know (Adair, 2004; Hámornik and Juhász, 2010), but this idea has been criticized by McInerney (2002). McInerney (2002) argued that knowledge cannot simply be regarded as stocked objects and she interprets knowledge as a set of dynamic processes of experience and learning. Others define knowledge as the accessibility of information centres on retrieving and locating information in organisations (Alavi and Leidner, 2001). In addition, (Davenport and Prusak, 1998, p. 5) define knowledge with all the perspectives abovementioned and view knowledge as a "fluid mix" of objects derived from people's minds for acting and learning.

Apart from the introduced epistemologies of knowledge, many scholars believe that knowledge is a critical capability of both individuals and organisations to influence actions (Ives *et al*., 1998). The capability includes capturing (Feraru, 2009), and judging (Tsoukas and Vladimirou, 2001) facts and obtaining skills (Feraru, 2009). With such capability, individuals and organisations are capable of making valid decisions in a complicated environment (Bennet and Bennet, 2004). In addition, knowledge can be considered as a field, like energy, which is in different forms, such as rational knowledge, emotional knowledge and spiritual knowledge (Bratianu and Bejinaru, 2019). These forms of knowledge can be transformed into another, thereby producing knowledge dynamics that can foster innovation and improve organisational performance (Bratianu and Bejinaru, 2020).

From the end of the 1980s to the beginning of the 1990s, scholars and practitioners realised the importance of the intangible assets of organisations in the knowledge-based economy (Sveiby, 1989). Drucker (1993) claimed that knowledge, rather than natural resources, is the driving force of firms to create value. In particular, Barney (1996) proposed that the competitive advantages of firms originate from the unique resources, such as knowledge, that they possess. Extending from the resource-based view, the knowledge-based view perceives knowledge as valuable resources (Grant, 1996b), which can support organisations' goals (Zawila-Niedzwiecki, 2015), benefit production of organisations' output (Aktharsha, 2011), and sustain firms' competitive advantages (Grant, 1996b). In accordance with the knowledge-based view (Barney, 1996; Corsino et al., 2019; Grant, 1996b), this study also considers knowledge as being the critical resources for the success of organisations, because only those firms that better manage their knowledge resources can achieve competitive advantages (Bloodgood, 2019; Grant, 1996a; Hussinki *et al*., 2017; Nonaka and Takeuchi, 1995).

2.1.2 Knowledge-based view of the firms

The resource-based view believes that differences in firm performance are caused by the refocuses that the firms own (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). Firms can achieve long-term competitive advantages (above average economic value or rent) if such resources are valuable, rare, imperfectly imitable, and not substitutable. Firms still can enjoy short-term competitive advantages even if the resources can be imitated, but as rivals imitate the resources, the competitive advantages of the firms appear to be diminishing (Peteraf and Barney, 2003). Firms might have many resources, but knowledge constitutes the most critical resource in the knowledge-based economy (Drucker, 1993), and drives the development of modern enterprises because knowledge

(e.g., patents, skills) represents the condition of 'value-rareness-imperfect imitability and substitutability'. For instance, Japanese automobile manufacturers enjoyed superior benefits in the 1990s because they possessed more new knowledge than their competitors (Nonaka and Takeuchi, 1995).

Derived from the resource-based view, but not the same, the knowledge-based view, first, considers knowledge is an important resource, and second, believes the existence of firms is based on the role of firms in creating, storing and applying knowledge. In general, there are three perspectives on the knowledge-based theory of firms. The first one holds the view that a firm is a knowledge-creating entity, proposed by Nonaka Ikujiro as the core. It was claimed that the firm is a knowledge-creating entity (Nonaka and Toyama, 2002) with a set of knowledge assets (Nonaka and Toyama, 2003), which synthesises various contradictions (Nonaka and Toyama, 2005), such as 'ba', routines, reward system, and leadership. The firm can be viewed as a configuration of 'ba' (Nonaka *et al.*, 2000). 'Ba' is either a physical or virtual shared place where knowledge is shared, created, and applied (Nonaka *et al*., 2000). The second view maintains that a firm is a knowledge integrator. The existence, organisation, and competitive advantages (Grant, 1996a; Grant, 1996b) of firms are based on the role of firms in integrating specialized knowledge of individuals. Knowledge is integrated through direction, routine, transfer, and sequencing (Grant, 1997). In addition, competitive advantages of the firm depend on knowledge integration efficiency (Grant, 1996a). Sustaining competitive advantage under a dynamic environment needs continuous innovation which requires flexible integration through either extending existing capabilities to create new knowledge or reconfiguring existed knowledge within new patterns of integration (Grant, 1996a). The third idea considers a firm as a dynamic, evolving, and quasi-autonomous knowledge-based activity (such as knowledge production and

application) system including different types of knowledge, e.g., conscious, automatic, objectified (Spender, 1996a), and collective knowledge, learning and memory capabilities, and a collection of tangible resources (Spender, 1996b).

To sum up, the knowledge-based theory believes competitive advantages of firms originate from the knowledge and depend on efficiencies of firms' knowledge processes, such as knowledge creation, acquisition, sharing, transferring, application, and retention.

2.1.3 KM practices and organisational performance

Knowledge processes, such as knowledge creation, acquisition, sharing, identification, application, and retention are mirrored by KM practices in the actual business operation of organisations. The key task of KM is to manage organisations to enable knowledge processes to succeed (Heisig, 2009) in creating value through KM practices. KM practices are also labelled as KM enablers, KM capabilities, KM facilitators, KM infrastructures, KM critical success factors and so forth (Inkinen, 2016) which are widely deployed in organisations for their daily operation. Andreeva and Kianto (2012, p.620) conceptualized KM practices as '*management practices that aimed to support efficient and effective management of knowledge for organisational benefit*' while Inkinen (2016, p.232) defined KM practices *'as the conscious organisational and managerial practices intended to achieve organisational goals through efficient and effective management of the firm's knowledge resources'*. Likewise, this study defines *KM practices as a series of managerial procedures and activities that enable knowledge to improve organisational performance*[1].

[1] Organisational performance including financial performance, non- financial performance, and overall organisational performance. Section 4.1.2.7 details the definitions of the performance types.

KM practices can be classified into four categories, namely, human-oriented factors (including culture, people, and leadership), organisation-oriented factors (including processes and structures), technology-oriented factors (including infrastructure and applications), and management process-oriented factors (including strategy, goals and measurement) (Heisig, 2009). By searching a massive number of papers[2], this study has identified the following KM practices from the KM factors of Heisig (2009) appeared in a large volume of studies, including *human-oriented factors*, such as

- KFOC (*KFOC refers to a set of shared values and beliefs in an organisation which enable employees to be passionate to learn, open to innovate, trust, collaborate with, and share knowledge to each other*),
- knowledge-based leadership (*knowledge-based leadership is defined as the capability of leaders to influence others on KM processes and activities*),
- knowledge-based human resource management[3] (*knowledge-based human resource management refers to manage recruitment, training, motivation, performance appraisal of employees with knowledge activities*), and
- organisational learning (*Organisational learning is defined as a dynamic learning process for knowledge creation, acquisition and integration to develop resources and capabilities of organisations* (Pérez López *et al*. 2005));

management process-oriented factors, such as:

- strategic KM (*strategic KM relates to the processes and infrastructures firms apply to obtain, create and share knowledge for developing strategies and making strategic decisions* (Zack, 2002));

[2] Details on the literature searching is introduced in Chapter 4

- the knowledge codification strategy (*the knowledge codification strategy is concerned with capturing, codification, and storage of explicit knowledge with the application of technologies* (Choi and Lee, 2012)), and
- the knowledge personalisation strategy (*the knowledge personalisation strategy focuses on increasing communication of tacit knowledge through interaction and social networks of people* (Oluikpe, 2012));

technology-oriented factors including

- KM-supportive IT (*KM-supportive IT refer to tools, platforms, and infrastructures developed by IT that are applied to support knowledge processes in organisations*)

and organisational factors including

- knowledge-based organisational structure (*knowledge-based organisational structure refers to an organisational design that facilitates knowledge processes and activities*)[3].

In addition, Heisig (2009) found knowledge application, identification, creation, acquisition, sharing, and retention were the most popular knowledge processes in KM frameworks. KM improves organisational performance through the interaction of knowledge processes according to knowledge-based theory while these knowledge processes are in the form of or facilitated by managerial procedures and processes which are manifested by the KM practices (Heisig, 2009). The underlying logic is that

[3] The number of studies concerning the knowledge-based human resources management-organisational performance relationship and the organisational structure-organisational performance relationship was too limited to conduct a meta-analysis. Therefore, these KM practices were not included in this study.

an organisation can outperform its counterparts if it can better implement these KM practices because these KM practices enhance the efficiency and effectiveness of knowledge processes in the organisation, as shown in Figure 2-1.

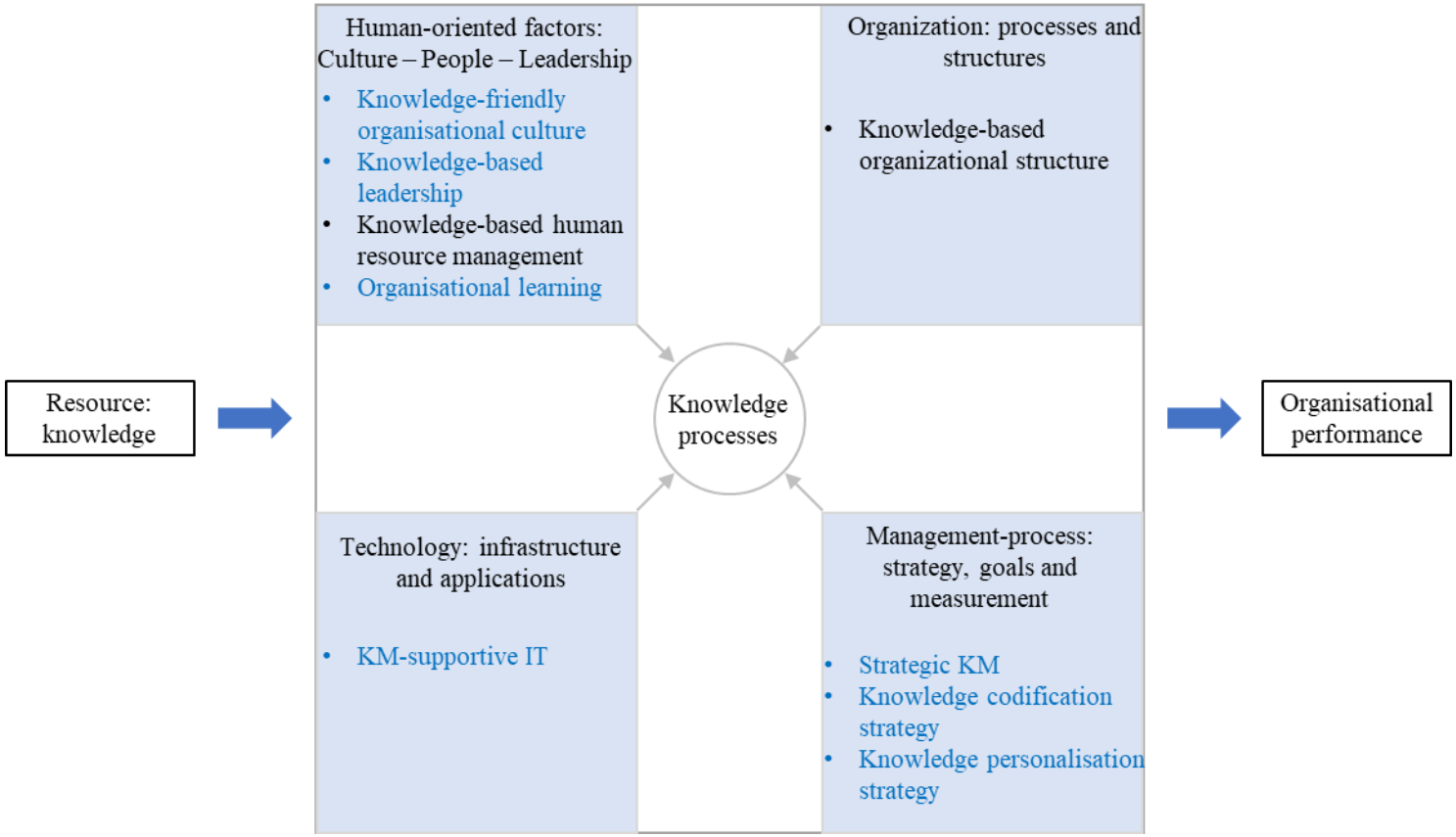


Figure 2-1: Theoretical framework of this study

2.1.4 KM in different contexts

Understanding organisation management theories in different cultural, economic, and industrial backgrounds is important for scholars and practitioners (Gelfand *et al*., 2007). It is widely acknowledged that management practices and strategies, such as organisation development (Jaeger, 1986), technology alliances foundation (Steensma *et al*., 2000), and KM (King, 2007) should consider the differences in national cultures (Hofstede, 1984, 1993, 2001) to fit the environment of the focal organisations (Robbins *et al*., 2013). The alignment of management practices with national cultures could result in higher work unit financial performance (Newman and Nollen, 1996). Besides national culture, a nation can be distinguished from one another by economic situations (Tsui *et al*., 2016). Incorporating the impacts of multiple contexts can further theoretical development and strengthen the inference of cultural effects (Tsui *et al*., 2016). Given the distinct institutional differences, variations in KM practices (Hussinki *et al*., 2017) and enablers (Magnier-Watanabe *et al*., 2011) were revealed in different countries, which suggests it is worth examining KM in different national economies. Finally, it was highly recommended that organisational research should consider the industry as a contextual factor (Gelfand *et al.*, 2007) because the industry might explain some phenomena of management. However, after deeply searching the literature in KM, it was found that the literature is relatively silent in terms of the contextual impacts on KM. Therefore, this study seeks to explore the impacts of these contextual factors: national culture, economy, and industry on the relationships between KM-organisational performance because these factors influence firms' operation and strategic choices as well as their KM activities. For instance, Apple Inc. designs its products in the US and assembles its products using Chinese contract manufacturers.

These two distinct business models need different KM practices to meet their requirements. Knowledge creation is more crucial in Apple Inc. in sustaining its competitive advantages while knowledge application to ensure product quality and efficiency is more important to Chinese contract manufacturers.

2.1.4.1 KM and national culture

National cultures are defined as 'the pattern of enduring personality characteristics found among the populations of nations' (Clark, 1990, p. 66), which might affect the KM activities since national culture is able to influence every individual's behaviour (King, 2007). National cultures mirror all people's thought about knowledge and their behaviour towards knowledge-related activities, such as knowledge acquisition, sharing, creation, application, and protection (King, 2007). National cultures also shape KM activities (Hussinki *et al*., 2017; Liu *et al.*, 2019) (e.g. learning, knowledge creation) and have an impact on KM solution adoption (Ang and Massingham, 2007).

Hofstede *et al.* (2010) proposed a six-dimension framework to portray the cultural characteristics of a nation, including power distance (PD), individualism versus collectivism (IC), masculinity versus femininity (MF), uncertainty avoidance (UA), long-term orientation versus short-term orientation (LS), and indulgence versus restrained (IR) culture. *Power distance reflects the extent of inequality in power between a less powerful person and a more powerful other in the same society* (Hofstede, 2001; Hofstede *et al.*, 2010). Human inequality occurs in any society which might originate from people's power, prestige, wealth, and educational background. The formulation of human inequality in organisations is obvious and inevitable because of leader-subordinate hierarchies in the organisations (Hofstede, 2001; Hofstede *et al*., 2010). Obviously, power distance naturally exists in organisations. Though distinctions

between small and large power distance societies can be vividly observed in organisations (Hofstede, 2001; Hofstede *et al*., 2010) that might affect KM activities of organisations, for instance, organisations are usually high centralised decision structures in larger power distance societies with low efficiency to transfer (Boone *et al.*, 2019) and share (Kivrak *et al.*, 2014) knowledge than a flat organisational structure in small power distance societies; employees expect to be consulted in small power distance regions while employees in large power distance regions expect to be told what to do (Hofstede, 2001; Hofstede *et al*., 2010). Innovation needs well-conducted champions in small power distance states but needs strong managerial support in large power distance states (Hofstede, 2001; Hofstede *et al*., 2010). Knowledge and information are open to all employees in small power distance countries while the flow of knowledge and information are restrained by the organisational hierarchy; in large power distance societies, leaders are likely to strengthen their power and sustain large power distance with their subordinates (Hofstede, 2001; Hofstede *et al*., 2010). Differences in KM between low- and high-power distance societies are summarised in Table 2-1.

Table 2-1: Differences in KM between small and large power distance societies

Small power distance	Large power distance
Knowledge is openly shared among all employees	Knowledge is constrained in the hierarchy
Innovation needs good champions	Innovation needs good support from managers
Knowledge smoothly flows within flat hierarchies	Knowledge difficultly flows due to high hierarchies
Managers are in consultive roles to offer expertise and knowledge	Managers are in commander role to tell others how and what to do
Subordinates can discuss objectives with leaders	Subordinates do what they are told to do
The modest expectation on the benefits of technology	The high expectation on the benefit of technology
Learning depends on two-ways of communication	Learning depends on others (e.g. teachers)

Individualism and collectivism portray the relationship between the individual and group in a specific society (Hofstede, 2001; Hofstede *et al*., 2010). In an individualism

based society, ties among people are loose and they are expected to merely take care of themselves and their families while in a collectivism based society, people are united and cohesive in-groups when they were born (Hofstede, 2001; Hofstede *et al*., 2010). Outstanding differences in KM also can be found in business organisations between individualistic and collective societies. For example, people are more likely to share knowledge with in-group members (Li, 2009; Zhang *et al.*, 2014) and have less innovative ideas in collective societies than in individualistic societies (Hofstede, 2001; Hofstede *et al*., 2010). In addition, people in individualistic societies are more passionate about adopting information technologies than people in collective societies (Khalil and Marouf, 2017; Laitinen *et al.*, 2015). People in individualistic societies like learning by themselves whereas people collective societies prefer to learn together (Furner *et al.*, 2009). Detailed comparisons of the differences in KM between individualistic and collective societies are shown in Table 2-2.

Table 2-2: Differences in KM between individualistic and collective societies

Individualistic societies	Collective societies
People are more likely to hide knowledge	People are more likely to share knowledge with others
Knowledge creation outside existing networks	Knowledge creation within existing networks
More innovative ideas in workplaces	Less innovative ideas in the workplace
Managers and subordinates work independently	Managers more likely to share knowledge with their subordinates if they are in the same group
Belief in individual decisions	Belief in collective decisions
Tasks prevail personal relationships	Reciprocal personal relationships prevail over tasks
More People are passionate about new techniques	More people likely hesitate over new techniques application
Training and learning are more effective at an individual level	Training and learning are more effective at a group level

Different ontologies on genders among different countries portray distinct national culture. Hofstede (2001) proposed two dimensions: *femininity and masculinity to describe the differences in genders that are reflected in the national culture*. In a masculine society, social gender roles are obviously different; for instance, men are ought to be assertive, tough, and successful in earning money, while women should be

modest, tender, and considerate and take care of their families (Hofstede, 2001; Hofstede *et al*., 2010). On the other hand, a feminine society shows similar social gender roles between males and females in which both men and women are modest, tender and focus on the quality of life (Hofstede, 2001; Hofstede *et al*., 2010). The degree of masculinity of a society affects people's KM activities as well. For example, learning opportunities are more equal in a feminine society while women have less learning opportunities in a masculine society (Johansson and Abrahamsson, 2018). Similarly, familiarity on IT application is more equal in a feminine society and women might have more problems in using IT in a masculine society (Reinen and Plomp, 1997; Orser and Riding, 2018). These differences are shown in Table 2-3.

Table 2-3: Differences in KM between masculine and feminine societies

Masculine societies	Feminine societies
People focus on the relationship and working environment	People tend to be interested in payment and work
Managers are more modest	Managers are more progressive
Communication is smoother	Communication is combined with conflicts
Women and men are more equally familiar with IT	Women are less familiar and have more problems with IT application than men
Learning opportunities are more equal in the workplace	Less learning opportunities for women in workplace

Uncertainty avoidance refers to the degree of ambiguity tolerance in a society and indicates people's comfort level in unstructured environments (Hofstede, 2011). Avoiding uncertainty about the future by the formulation of technology, law, and religion is a basic fact in human history. Similarly, to predict the future, organisations avoid uncertainty through the application of technology, rules, and rituals (Hofstede, 2001). Organisations use technologies, such as adopting robots to replace workers to improve production efficiency and quality to produce stable and predictable outcomes. In addition, organisational rules are applied to reduce internal uncertainty raised from the unpredictability of employees' and stakeholders' behaviour. Social rituals are reflected by the languages and taboos commonly used in employees' gatherings, such

as business conferences, organisational training programmes (Hofstede, 2001). Uncertain avoidance affects people's value, attitude, and behaviour in KM. For example, new ideas are more welcomed in weak uncertainty avoidance societies (Kivrak *et al*., 2014; Li, 2009); managers share knowledge to adapt to turbulent environments in weak uncertainty avoidance societies while managers hoard knowledge to avoid changing in strong uncertainty avoidance societies. More knowledge is personalised because of tightened social networks in weak uncertainty avoidance societies while more knowledge is codified to reduce uncertainty in strong uncertainty avoidance societies. It is easier to deploy new IT projects in weak uncertainty avoidance societies (Wilkesmann *et al.*, 2009). Table 2-4 sets out differences in KM between weak and strong uncertainty avoidance societies.

Table 2-4: Differences in KM between weak and strong uncertainty avoidance societies

Weak uncertainty avoidance societies	Strong uncertainty avoidance societies
New ideas are welcome	New ideas lead to anxiety and stress
Managers share knowledge to adapt to an unstable situation	Managers keep the knowledge to avoid an unstructured situation
Managers focus on strategic development	Managers focus on business operation
Knowledge personalisation prevails because of tight social network	Knowledge codification prevails to reduce uncertainty
More IT are applied	Less IT are applied
People like open-ended learning and discussion	People like structured lectures and seek specific answers

Long-term versus short-term orientation originated from a Chinese Value Survey around 1985 conducted by Michael Harris Bond and *reflects people's value and belief toward past, now and future (*Hofstede *et. al*, 2010). Long-term orientation stands for the cultivating of virtues oriented towards future rewards, e.g. perseverance and thrift while short-term orientation stands for the cultivating of virtues concerning the past and present, e.g. respect for tradition, "face" saving, and fulfil social obligations (Hofstede *et. al*, 2010, p. 239). Distinctions of KM between long-term and short-term oriented cultures can also be found. For instance, learning, honesty, adaptiveness, accountability, and self-discipline are valued in long-term orientation societies while freedom, rights,

achievement and independent thinking are valued in short-term oriented societies (Hofstede *et al*., 2010). KM-related IT are more welcomed in long-term oriented societies (Khalil and Marouf, 2017; Ribière *et al.*, 2010). More details are shown in Table 2-5.

Table 2-5: Differences in KM between long-term and short-term orientation

Long-term orientation societies	Short-term orientation societies
Learning, honesty, adaptiveness, accountability, and self-discipline are valued	Freedom, rights, achievement and independent thinking are valued
Long-term investment (of KM) is worthy for future	Long-term investment (of KM) is not favoured but short-term benefits are attractive
IT investment and application is less welcomed	IT investment and application is more welcomed
Education is embedded in people's mindset	Folk wisdom and witchcraft are more preferred

Indulgence-oriented versus restrained culture is known in scholarly works as "happiness research". *Indulgence refers to a society that allows relatively free gratification of basic and natural human desires related to enjoying life and having fun while restrained culture refers to a society that controls gratification of needs and regulates it by means of strict social norms* (Hofstede, 2011, p. 15). Different attitudes towards life and knowledge (Hofstede *et al*., 2010) can be found between indulgence-oriented and restrained culture, for instance, more freedom in speech, creative ideas, IT for entertainment and less commitment on learning in indulgence-societies than in restraint-oriented societies. In addition, students in restrained cultures are more likely to enrol online courses than students in indulgence-oriented societies (Gómez-Rey *et al.*, 2016). These differences are shown in Table 2-6.

Table 2-6: Differences in KM between indulgence- and restraint-oriented societies

Indulgence oriented societies	Restraint oriented societies
More people feel happy	Fewer people feel happy
Freedom to speech is important	Freedom to speech is not important
More open to talking with strangers	Less open to talking with strangers
The knowledge-value creation relationship is stronger	The knowledge-value creation relationship is weaker
Social networks and friendship are more valued	Social networks and friendship are less valued
More IT are used, especially for entertainment	Less IT are used
Less commitment to learning	More commitment to learning

2.1.4.2 KM and national economy

National economies, always classified as developed economies or developing economies, reflects the basic economic country status, which affects many aspects of people's social life, such as economic activities, education level, social welfare, etc. In addition, the national economy is an important factor that affects managerial practices and firm performance. For instance, compared with developing countries, more patents per people are granted and more state-of-the-art technologies are invented in developed countries; a higher percentage of people are well educated and poor people are more likely to have the opportunity to learn, etc. The detailed differences in KM of firms between developed and developing economies are shown in Table 2-7.

Table 2-7: Differences in KM and firms between developed and developing economies

Developed economies	Developing economies
More patents per people granted	Fewer patents per people granted
A higher percentage of people are well educated	A higher percentage of people are illiterate
More state-of-the-art technologies are invented and applied	Less state-of-the-art technologies are invented and difficult to apply state-of-the-art technologies
Poor people more possible to have the opportunity to learn	Poor people are unlikely to have the opportunity to learn
Service industries produce more value for the nation	Manufacture industries produce more value for the nation
Many modern management theories were developed	Hardly to develop modern management theories
More multi-national companies around the world	Less multi-national companies around the world

2.1.4.3 KM and industry

The industry is one of the factors that manifest different strategic concerns of organisations, which impact KM practices. According to a survey from Chase (1997), more KM projects were initiated in the consulting industry and automotive manufacturing industry than others in the 1990s. Chawla *et al.* (2010) also reported that the IT industry outperformed the manufacturing and power supply industries in terms of KM initiatives. In addition, Kianto and Andreeva (2014) argued that the KFOC

positively affected cost deduction, efficiency and revenue improvement in the service industries, but these relationships were insignificant in manufacturing firms. The impacts of strategic KM on organisational performance was also strengthened in service industries (Kianto and Andreeva, 2014) while the influences of KM-supportive IT were negative on innovation in the manufacturing industry (Kianto and Andreeva, 2014). Choi and Lee (2003) also found that the codification strategy was more effective in affecting organisational performance in the manufacturing industry while the personalisation strategy was more effective in impacting organisational performance in the finance industries. Despite the distinctions of KM in different industries being found, as shown in Table 2-8, what is known about the role of industries on KM practices-organisational performance relationships is still sparse. In the following sections of this chapter, a set of research models based on different KM practices in different environmental settings aims to solve the problems on the KM practices-organisational performance relationships and impacts of contextual factors on these relationships.

Table 2-8: Differences in KM between manufacturing industry and service industries

Manufacturing industry	Service industries
KM is less popular	KM is more popular
KFOC is less essential	KFOC is more essential
Knowledge application is more important	Knowledge creation is more important
Knowledge codification is more critical	Knowledge personalisation is more critical
A lower percentage of employees have an undergraduate degree or above	A higher percentage of employees have an undergraduate degree or above
KM-supportive IT are less important	KM-supportive IT plays a vital role

2.2 Research models: KM practices and organisational performance (in different contexts)

Each of the KM practices has different roles in facilitating knowledge processes, but they both positively affect the financial performance and non-financial performance of organisations, as these KM practices enable organisations to manage knowledge more efficiently and effectively and thus to create more value. The value is not only reflected

by financial indicators that can be measured by accountants, such as return on investment, market share, etc. but is also mirrored by non-financial indicators, such as cost reduction, time to market, etc. It indicates that the role of KM in affecting organisational performance is in multiple ways. To be specific, this study tries to explore the impacts of KM practices on the main organisational performance types that appear in the literature, namely, financial performance, non-financial performance, and overall organisational performance (Overall organisational performance is measure by both financial and non-financial indicators). The following sections propose a set of research models by showing the direct effects between KM practices and three types of organisational performance as well as the moderation effects of contextual factors on these direct relationships.

2.2.1 Research model I: KFOC and organisational performance

Organisational culture is defined as a complex set of values, beliefs, assumptions, and symbols that define the way in which a firm conducts its business" (Barney, 1986, p. 657) while a *KFOC is considered as a set of shared values and beliefs in an organisation which enable employees to be passionate to learn, open to innovate, trust, collaborate with, and share knowledge to each other*. A KFOC lays the foundation for successful KM initiatives, in which learning is highly motivated and knowledge supersedes hierarchy (Davenport *et al*., 1998). It also facilitates knowledge processes (Kianto *et al.*, 2013) on employee creativity and business performance (Imran *et al.*, 2018) and affects the effectiveness of KM strategies (Chen and Liang, 2011). If an organisation's culture does not support KM-related behaviour, for instance, employees hide knowledge for themselves and are reluctant to trust each other (Ribière and Calabrese, 2016), such an organisation is more likely to be in trouble for managing

knowledge in creating value. It is important for such an organisation to evaluate its KM readiness (Tsui, 2016), especially on organisational culture so as to figure out appropriate KM initiatives for organisational success. Therefore, the KFOC enables organisational knowledge to be effectively created, acquired, shared, transferred, and applied so that value can be successfully created for organisations. According to the knowledge-based view, better organisational performance is achieved once knowledge is efficiently integrated in the organisation with the KFOC actuators.

Previous review studies about organisational culture in the KM field either only summarised previous studies or proposed conceptual models. For instance, Tian *et al.* (2018) argued that the effects of organisational culture and national culture on innovation were complex and heterogeneous and suggested further quantitative approaches should be applied to investigate these relationships. Mueller (2012) identified different perspectives on the organisational culture concerning KM research. Jacks *et al.* (2014) and Al Saifi (2015) merely outlined a conceptual framework and argued that the organisational culture was related to the success of firms without showing any empirical evidence of their research models. Up to now, none of the review studies concerning organisational culture and KM has examined the impacts of the KFOC on organisational performance in an integrative approach. Whether and how the KFOC affects organisational performance is unclear due to inconsistent empirical evidence.

Many scholars tried to disclose the relationship between KFOC and organisational performance with empirical evidence, but the empirical evidence on this relationship is still inconclusive. Cheng *et al*. (2008) pointed out that the trust dimension of KFOC could not affect organisational performance directly, while Song and Kolb (2013)

argued that the learning culture of KFOC did not significantly impact on overall performance. Payal *et al.* (2016) also found that KFOC did not affect organisational performance. On the other hand, the majority of the empirical studies revealed that the KFOC significantly influenced overall organisational performance[4] (Boumarafi and Jabnoun, 2008; Baker and Sinkula, 1999b; Chen *et al.*, 2008; Chuang *et al.*, 2013; Chen *et al.*, 2009; Chen *et al*., 2011; Forte *et al.*, 2016; Guimarães *et al.*, 2016; Kamath *et al.*, 2016; Kamhawi, 2012; Khan *et al*., 2015; Mageswari *et al*., 2017; Matin and Sabagh, 2015; Migdadi *et al.*, 2016; Migdadi, 2009; Mousavizadeh *et al.*, 2015; Palacios-Marqués *et al.*, 2011; Pham and Nguyen, 2017; Rezaei *et al.*, 2017; Ruiz-Mercader *et al.*, 2006; Samson *et al.*, 2017; Valdez-Juárez *et al*., 2016; Wei, 2010; Wong and Wong, 2011). Though inconsistent relationships exist it still seems that, for the most part, the research evidence has been positive therefore, it assumes:

$H1_1$: KFOC is positively related to overall organisational performance.

In addition, numerous studies were conducted to examine the relationship between KFOC and the financial performance of firms, but the findings were inconsistent as well. Though Shih *et al*. (2009) found that the KFOC was not related to the financial performance of firms while Kianto and Andreeva (2014) reported that KFOC significantly affected the financial performance of firms in the service industries but this causal relationship was insignificant for firms in the manufacturing industry. On the other hand, the majority of scholarly works (Akgün *et al.*, 2014; Collins and Smith, 2006; Chen *et al*., 2008; Chen and Liang, 2011; Feng *et al.*, 2014; Hsu and Sabherwal, 2012; Lee and Choi, 2010; Lin *et al.*, 2013; Marouf, 2016; Pett and Wolff, 2016; Rezaei

[4] Overall organisational performance measures organisational performance through both financial and non-financial indicators.

et al., 2017; Santos-Vijande *et al.*, 2013) showed a positive relationship between the KFOC and financial performance. Therefore, it assumes:

$H1_2$: KFOC is positively related to financial performance.

Finally, a plethora of research also focused on investigating the relationship between the KFOC and non-financial performance of firms, but Lee *et al*. (2012) and Noh *et al.* (2014) argued that the trust dimension of the KFOC could not affect the non-financial performance of firms. In addition, Mills and Smith (2011) also pointed out that the KFOC-non-financial performance relationship was insignificant. However, more studies showed that the KFOC had a positive impact on the non-financial performance (Chong *et al.*, 2011; Chuang *et al*., 2013; Cooper *et al.*, 2016; Huang *et al.*, 2010; Giampaoli and Ciambotti, 2016; Jiménez-Jiménez *et al.*, 2014; Kim and Hancer, 2010; Machuca and Costa, 2012; Migdadi *et al*., 2016; Mageswari *et al*., 2017; Mousavizadeh *et al*., 2015; Moon and Lee, 2014; Santos-Vijande *et al*., 2013; Shih *et al*., 2009; Sucahyo *et al.*, 2016; Zhang *et al.*, 2007; Tan and Wong, 2015). Regardless of a small portion of insignificant evidence, the majority of studies claimed that the KFOC is a positive predictor on the non-financial performance of organisations. Therefore, it assumes:

$H1_3$: KFOC is positively related to non-financial performance.

Theoretically meaningful contextual explanations may exist for conflicted findings (Kirkman *et al.*, 2006) for the KM practices-organisational performance relationships because contexts are contingent factors, which may influence KM practices and moderate the relationships between KM practices and their payoffs. Additionally, contexts (e.g. national culture, national economy, and industry) can have strong effects

on research findings (Johns, 2006). As discussed in section 2.2.3.1, national culture is one of the most important contextual factors that affect people's KM activities as well as the relationships between KM and its outcomes.

National culture can be reflected in six dimensions. The first one, power distance reflects the tolerance degree of people in terms of inequality (Hofstede, 2001). Managers are likely to hold their knowledge to sustain their power in large power distance societies. In addition, knowledge tends to be limited to managers in larger power distance societies and is difficult to reach bottom-line employees due to wide hierarchy in large power distance societies. The KFOC strongly affect employees' belief on knowledge sharing, learning, and innovation, but the effects of KFOC on organisational performance is mitigated in large power distance societies because knowledge flow might be retarded by the high hierarchies of organisations as well as the knowledge hiding behaviour of employees in large power distance. Then, it assumes that:

H_{PDa1}: The KFOC-overall organisational performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDa2:}$ The KFOC-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDa3:}$ The KFOC-non-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

Secondly, individualism and collectivism describe the relationship between the individual and group in a specific society (Hofstede, 2001). KFOC emphasises an environment in which employees can trust and collaborate with each other for

knowledge sharing, which is more easily developed in collective societies as employees are more naturally and socially integrated and more likely to work for mutual benefit once they recognize each other as the members of the same group. On the other hand, employees are mainly focused on their own benefits so that they are unlikely to share knowledge in a large group of people that would not benefit themselves. Then, it assumes:

H_{ICa1}: The KFOC-overall organisational performance relationship will be strengthened in collective regions and weakened in individualistic regions

H_{ICa2}: The KFOC-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

H_{ICa3}: The KFOC-non-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

Thirdly, femininity versus masculinity mirrors the differences in gender for a society (Hofstede, 2001). People in feminine societies focus more on relationships and the working environment (Hofstede, 2001) so that they are more willing to enjoy a KFOC in which they trust and collaborate with each other; however, people in masculine societies centre more on payment and outcome of work (Hofstede, 2001) so that they are more likely to hide knowledge as a way to protect themselves. In addition, a learning environment is more equal for all employees in feminine societies than in masculine societies. Therefore, it assumes:

$H_{FMa1:}$ The KFOC-overall organisational performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMa2:}$ The KFOC-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMa3:}$ The KFOC-non-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

Fourthly, uncertainty avoidance reflects the degree of ambiguity tolerance in a society (Hofstede, 2001) and such differences in uncertainty tolerance of people show distinctive attitudes towards KM. It is more possible for KFOC to be inherently embedded in the organisations of the weak uncertainty avoidance regions because people are more likely to trust each other than in strong uncertainty avoidance societies (Hofstede, 2001). In addition, new ideas are easier to be accepted in weak uncertainty avoidance regions (Hofstede, 2001) than in strong uncertainty avoidance regions. Therefore, it assumes:

$H_{UAa1:}$ The KFOC-overall organisational performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

$H_{UAa2:}$ The KFOC-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

H_{UAa3}: The KFOC-non-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

Fifthly, long-term versus short-term orientation denotes people's values and beliefs about the past, present, and future in society (Hofstede *et al*., 2010). Business values, such as learning, honesty, accountability, adaptiveness, and self-discipline are more

attractive in long-term orientated societies while business values, such as freedom, achievement, rights, and thinking for oneself are more popular in short-term oriented societies (Hofstede *et al*., 2010). It is obvious that a KFOC is more likely to be nurtured in long-term oriented societies. On the other hand, it is difficult to obtain a return of investment in KM in a short time because it takes time for organisations and employees to embark on KM. For instance, one of the obvious obstacles of KM is in lacking KFOC, and it is impossible to cultivate a KFOC overnight. It needs effort and time to change employees' attitudes and behaviour to embrace KM. In addition, transforming an innovative idea into a product is always time-consuming. However, a short-term orientated society expects quick results while the expectation of a long period (e.g. ten years) profits from the present is quite normal in long-term oriented societies. As such, the KFOC, which emphasises continuously knowledge sharing and innovation, contradicts the value of a short-term oriented society. Therefore, it assumes:

$H_{LSa1:}$ The KFOC-overall organisational performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSa2:}$ The KFOC-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSa3:}$ The KFOC-non-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

Finally, indulgence-oriented versus restraint-oriented culture compares people's perceptions of happiness and gratification (Hofstede *et al*., 2010). Studies on the happiness of knowledge-intensive workers have attracted great attention from scholars (Engelbrecht, 2007; Salas-Vallina *et al.*, 2018). It was argued that happiness strengthens

the relationship between employees and their activities and outcomes, such as the knowledge sharing-team proactivity relationship (Liu *et al.*, 2018b), and the authentic leadership-creativity relationship (Semedo *et al.*, 2017). More people perceive themselves as happy in indulgence-oriented societies. In addition, people are more open to communicating with others in indulgence-oriented societies (Hofstede *et al*., 2010). It is reasonable to suppose that KFOC is easier to be fostered in an indulgence society. Therefore, it assumes:

$H_{IRa1:}$ The KFOC-overall organisational performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

$H_{IRa2:}$ The KFOC-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

$H_{IRa3:}$ The KFOC-non-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

Besides national culture, the national economy also affects KM activities of organisations. For example, knowledge creation is more active in developed countries and more patents per people are granted. In addition, more advanced techniques and tools are invented in developed countries. Such innovation and invention cannot be achieved without a mature KFOC. Therefore, it assumes:

$H_{Ea1:}$ The effect of KFOC-overall organisational performance relationship in developed countries is larger than in developing countries.

$H_{Ea2:}$ The effect of KFOC-financial performance relationship in developed countries is larger than in developing countries.

$H_{Ea3:}$ The effect of KFOC-non-financial performance relationship in developed countries is larger than in developing countries.

The characteristics of KM are diversified across industries. It is believed that the service industries are more knowledge-intensive than traditional manufacturing industry because service products are intangibly produced by the knowledge interactive of knowledge workers involved in KM activities (Kianto and Andreeva, 2014). In addition, employees' knowledge, experience, and skills are more important in the service industries than in the manufacturing industry (Kianto *et al.*, 2010). It is more necessary to embark on KM for the service industries, especially, to foster a KFOC. Chawla *et al*. (2010) also argued that the KFOC was more mature in IT-related service firms than manufacturing firms. Once a KFOC is well formulated, the firms in service industries can enjoy competitive advantages by better managing their knowledge than others. Therefore, it assumes:

$H_{Ia1:}$ The effect of KFOC-overall organisational performance relationship in service industries[5] is larger than in manufacturing industry.

$H_{Ia2:}$ The effect of KFOC-financial performance relationship in service industries is larger than in manufacturing industry.

$H_{Ia3:}$ The effect of KFOC-non-financial performance relationship in service industries is larger than in manufacturing industry.

[5] Multiple industries include of both manufacturing and service industries when scholars collected data. As multiple industries are combination of service and industries, it is difficult to compare with the service and manufacturing industry, so the studies collected data from multiple industries were excluded in categorical analysis concerning industries.

Figure 2-2 shows the research model concerning KFOC-organisational performance relationships as well as the relationships in different contexts.

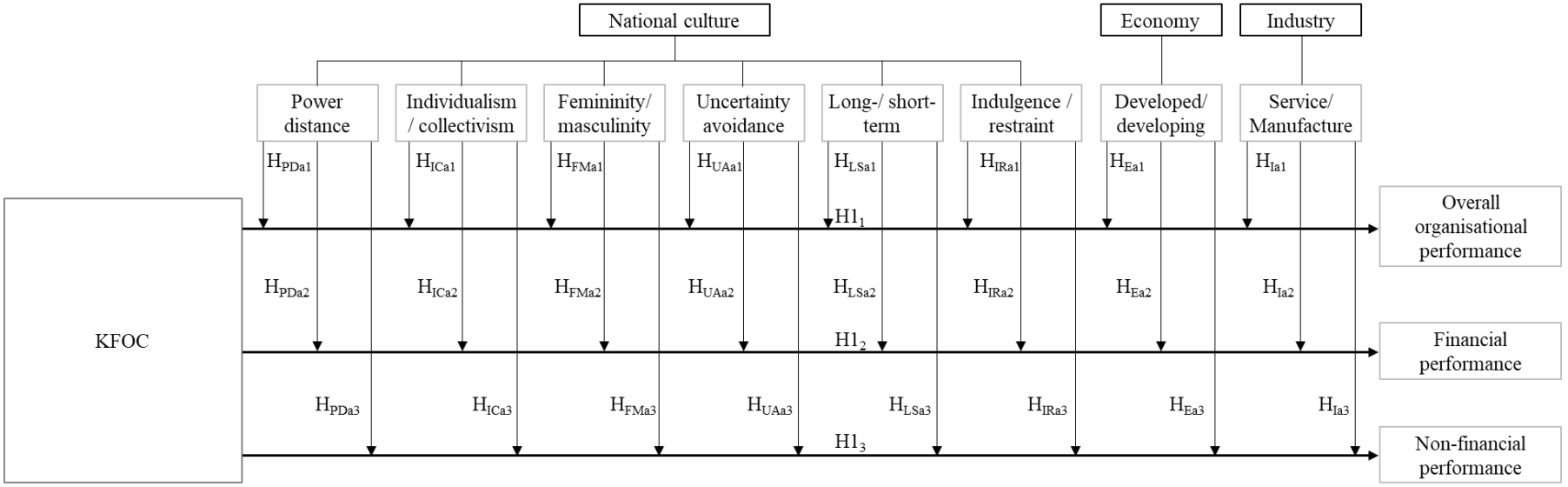


Figure 2-2: Research model I KFOC and organisational performance

2.2.2 Research model II: Knowledge-based leadership and organisational performance

KM is difficult to succeed without support from top management executives (Davenport *et al*., 1998; Liu *et al.*, 2018a) because leaders influence employees in terms of KM activities, for instance, managers affect employees' knowledge sharing behaviour (Yin *et al.*, 2019). In other words, knowledge-based leadership characterized by a positive attitude and supportive behaviour toward KM by the top management executives is a critical success factor for KM (Davenport *et al*., 1998; Heisig, 2009). Knowledge-based leadership *is the capability of leaders to influence others on KM processes and activities.* To show this capability, managers should demonstrate a positive attitude towards KM and actively participate in KM projects; managers also emphasise the importance of knowledge for their businesses; managers provide enough resources to implement KM projects; managers also inspire knowledge activities and learning behaviour of employees; a top executive, such as chief knowledge officer is assigned to lead KM activities for the organisation (Liu *et al*., 2018a). If managers show the knowledge-driven leadership style, employees can fully understand the importance of KM and more easily accept KM, especially when organisations need to alter their culture into a KFOC and embark on KM initiatives. With the endorsement of managers on KM, knowledge resources appear to be more effectively configured in the organisations. Therefore, organisations are more likely to achieve better performance with the capability of knowledge-based leadership that they possess (Inkinen, 2016).

The relationship between leadership and organisational performance has been a popular research topic over the past decades. Thus far, a number of studies have used the meta-analysis method to examine the relationship between leadership and organisational

performance. For instance, previous meta-analysis research has examined the effects of board structure (Dalton *et al.*, 1998), leadership structure (Dalton *et al.*, 1998; Rhoades *et al.*, 2001), charismatic leadership (Degroot *et al.*, 2000) on the financial performance of firms. Nevertheless, current meta-analytic studies make no attempt to address the question of to what extent that knowledge-based leadership affects organisational performance.

On the other hand, the knowledge-based leadership-organisational performance relationships remain equivocal since both significant and insignificant results were revealed. Inkinen and Kianto (2014) reported that the knowledge-based leadership did not influence the market performance of Finnish firms while Tang and Lai (2016) claimed that the leadership style could not affect the non-financial performance of organisations. Likewise, Kim and Hancer (2010) pointed out that the relationship between knowledge-based leadership and the non-financial performance of firms was insignificant. In contrast, a great deal of previous research suggested the knowledge-based leadership positively impacted on the overall organisational performance (Hsu, 2008; Jain and Moreno, 2015; Kamhawi, 2012; Mousavizadeh *et al*., 2015; Mageswari *et al*., 2017; Noruzy *et al*., 2013; Pee *et al.*, 2010; Samson *et al*., 2017), financial performance (García-Morales *et al.*, 2008; Lee and Choi, 2010; Hartono *et al.*, 2016), and non-financial performance (Gowen *et al.*, 2009; Jain and Moreno, 2015; Lee *et al*., 2012; Mousavizadeh *et al*., 2015; Mageswari *et al*., 2017; Sucahyo *et al*., 2016; Tan and Wong, 2015).

To sum up, it is a widely held view that knowledge-based leadership is vital for the success of KM, but the relationship between knowledge-based leadership and organisational performance remains vague. This study tries to consolidate knowledge-

based leadership-organisational performance relationships with the meta-analysis technique, therefore, based on the majority significant findings on these relationships, it assumes:

$H2_1$: Knowledge-based leadership is positively related to overall organisational performance.

$H2_2$: Knowledge-based leadership is positively related to financial performance.

$H2_3$: Knowledge-based leadership is positively related to non-financial performance.

Leadership characteristic (Bealer and Bhanugopan, 2013), traits, behaviour (Hanges *et al.*, 2016; Koopman *et al.*, 1999), and structure (Li and Harrison, 2008) vary across national cultures (Gerstner and Day, 1994) since national culture effectively impacts on executives' mindsets (Geletkanycz, 1997) and leadership prototypes (Brodbeck *et al.*, 2000). For instance, charismatic leadership was more desired in future orientation, gender egalitarianism and in-group collective societies than in high power distance societies (Hanges *et al*., 2016). In addition, leadership was indirectly affected by national culture through leadership expectation and the most effective leadership was by those who were in line with national cultural expectation (Dorfman *et al.*, 2012).

Managers with knowledge-based leadership show positive attitudes towards KM projects and are more likely to participate in KM. These managers also demonstrate consultative roles to their subordinates in organisations with active knowledge flows. In small power distance regions, consultative leadership leads to better organisational performance (Hofstede, 2001; Hofstede *et al*., 2010). Managers in small power distance regions rely on their knowledge and experience while managers in large power distance regions depend on formal regulations to work (Hofstede, 2001). Flatten *et al.* (2015)

argued that the effect on the transformational leadership-knowledge acquisition and assimilation relationships was stronger in small power distance societies. Therefore, managers in small power distance countries are likely to embark on a KM journey more successfully than managers in large power distance countries. Then, the impact of knowledge-leadership on organisational performance is more evident in small power distance regions than in large power distance regions. Therefore, it assumes:

$H_{PDb1:}$ The knowledge-based leadership-overall organisational performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDb2:}$ The knowledge-based leadership-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDb3:}$ The knowledge-based leadership-non-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

The employers-employees relationship is expected to be intimate in collective regions. The managers are considered as seniors who are more responsible in taking care of their subordinates in collective societies (Hofstede, 2001). Managers in collective societies are more open to sharing their knowledge with their subordinates when the managers and subordinates are within a group (Hofstede, 2001). Knowledge-based leadership emphasises the positive behaviour and attitude of managers on KM. For instance, managers spontaneously share knowledge with subordinates. Following this approach,

managers in collective societies are more likely to demonstrate knowledge-based leadership in the workplace. Thus, it assumes:

$H_{ICb1:}$ The knowledge-based leadership-overall organisational performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICb2:}$ The knowledge-based leadership-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICb3:}$ The knowledge-based leadership-non-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

Leadership styles are distinct in feminine and masculine societies. Managers in feminine societies are more modest while managers in masculine societies are more forceful in career development (Hofstede, 2001). Modest managers are more likely to share knowledge with their subordinates because managers and employees are considered the same. On the other hand, managers in masculine societies are considered as culture heroes (Hofstede, 2001) and they tend to hide knowledge to sustain their mysterious roles in the organisation. Therefore, managers in feminine societies are more likely to demonstrate knowledge-based leadership in the workplace than managers in masculine societies. Then, it assumes:

$H_{FMb1:}$ The knowledge-based leadership-overall organisational performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMb2:}$ The knowledge-based leadership-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMb3:}$ The knowledge-based leadership-non-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

The power of managers is affected by the control of uncertainty. Managers in a large uncertainty avoidance environment seek knowledge to be more authoritative and powerful to avoid unpredictability than in a small uncertainty avoidance environment (Hofstede, 2001); in addition, top managers are more involved in business operations in strong uncertainty avoidance regions while top managers like to participate in strategy development in weak uncertainty avoidance environments (Hofstede, 2001). Managers in weak uncertainty avoidance regions are more likely to demonstrate knowledge-based leadership than in strong uncertainty avoidance regions as they are more likely to initiate strategic KM to provide knowledge-based business strategies and planning. Therefore, it assumes:

$H_{UAb1:}$ The knowledge-based leadership-overall organisational performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

$H_{UAb2:}$ The knowledge-based leadership-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

$H_{UAb3:}$ The knowledge-based leadership-non-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

Managers in short-term societies tend to avoid deficits due to long-term investment, even though such investment could benefit the organisation later. In contrast, managers

in long-term societies are more persistent and believe the future is better than today (Hofstede, 2001) and are given more time and resources to achieve such outcomes (Hofstede *et al*., 2010). These managers are more likely to initiate long-term investment in knowledge activities, such as continuous research and development. Therefore, it assumes:

$H_{LSb1:}$ The knowledge-based leadership-overall organisational performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSb2:}$ The knowledge-based leadership-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSb3:}$ The knowledge-based leadership-non-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

Managers are more likely to support KM initiatives in indulgence-oriented societies as such managers may need more time to communicate with their subordinates to show their positive attitudes towards KM. In contrast, managers in restrained culture might be unwilling to frequently communicate with their subordinates. Knowledge-based leadership of managers in indulgence-oriented societies might be more obviously demonstrated to their subordinates. Then, it assumes:

$H_{IRb1:}$ The knowledge-based leadership-overall organisational performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

$H_{IRb2:}$ The knowledge-based leadership-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

$H_{IRb3:}$ The knowledge-based leadership-non-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

Most of the modern enterprise management theories including KM originate in developed countries. The managers in developed countries can access and apply these theories to guide their management practices more easily. They are also professionally trained during the industrialisation of society for over two hundred years. On the other hand, western theories might be inapplicable in developing countries (Blunt and Jones, 1997; Easterby-Smith, 1998). It also takes time for managers in developing countries to embark on the latest excellent managerial practices due to the limitations of resources, technologies, and individual capabilities. Therefore, managers better understand and implement KM in developed countries than in developing countries. Based on such a fact, it assumes:

$H_{Eb1:}$ The effect of knowledge-based leadership-overall organisational performance relationship in developed countries is larger than in developing countries.

$H_{Eb2:}$ The effect of knowledge-based leadership-financial performance relationship in developed countries is larger than in developing countries.

$H_{Eb3:}$ The effect of knowledge-based leadership-non-financial performance relationship in developed countries is larger than in developing countries.

It is mandatory for managers in service industries to demonstrate a knowledge-based leadership to endorse KM activities because the values produced is based on the

knowledge interaction of knowledge workers in the service industries. It is more difficult in service industries to achieve competitive advantages if managers lack support for KM. Therefore, managers in the service industries more actively participate in KM and offer sufficient resources for KM than in the manufacturing industry (Chawla *et al*., 2010), therefore, it assumes:

$H_{Ib1:}$ The effect of knowledge-based leadership-overall organisational performance relationship in service industries is larger than in manufacturing industry.

$H_{Ib2:}$ The effect of knowledge-based leadership-financial performance relationship in service industries is larger than in manufacturing industry.

$H_{Ib3:}$ The effect of knowledge-based leadership-non-financial performance relationship in service industries is larger than in manufacturing industry.

Research model II shows the relationships between knowledge-based leadership and organisational performance relationships, as well as the moderating relationships of contextual factors, as set out in Figure 2-3.

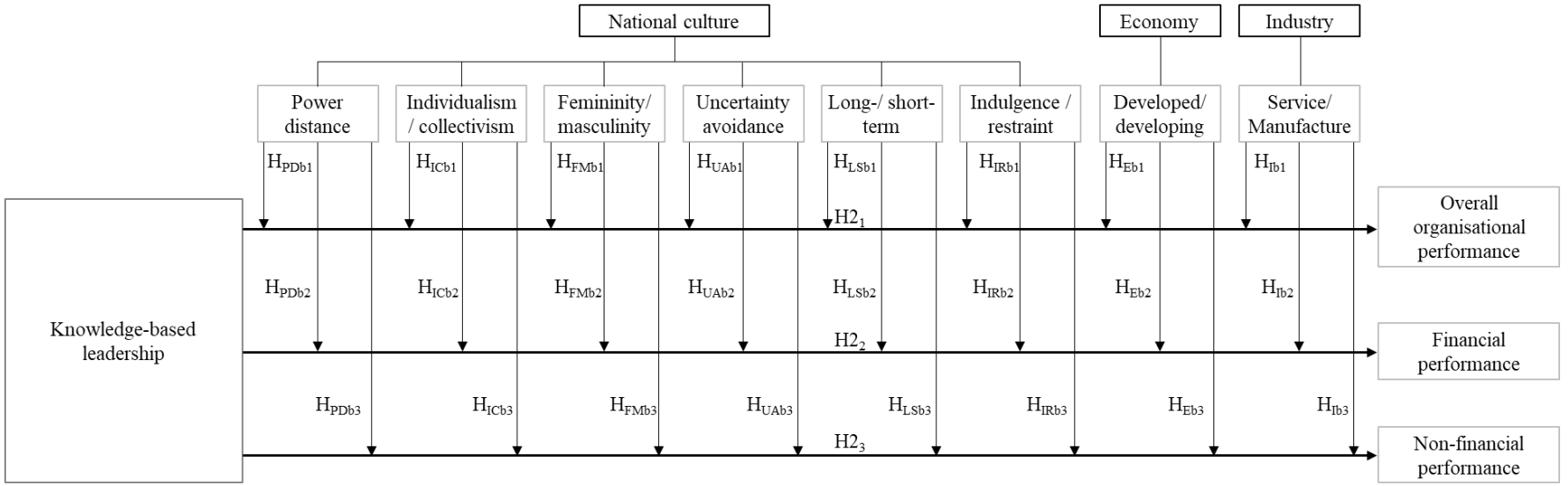


Figure 2-3: Research model II knowledge-based leadership and organisational performance

2.2.3 Research model III: Strategic KM and organisational performance

Strategic KM defines the vision and mission of KM in organisations, which is vital for the success of KM (Mousavizade and Shakibazad, 2019; Davenport *et al*., 1998). Strategic KM relates to the procedures and infrastructures firms apply to obtain, create and share knowledge for developing strategies and making strategic decisions (Zack, 2002). The KM strategies defined in the KM strategic planning of organisations depict the overall approach a firm tends to adopt to align its knowledge resources with its business strategy and to develop its intellectual resources and capabilities that the desired competitive strategy needs, thereby reducing the knowledge gaps between the unknown and the known in terms of performing its strategy and strengthening its competitiveness (Zack, 1999).

Strategic KM is concerned with the management of an organisation's current and future strategic knowledge (Hussinki *et al*., 2017). A formal KM strategy links the overall organisational vision and KM direction (Serenko *et al.*, 2017) in which the clear goals of KM (Lee and Choi, 2010; Tan and Wong, 2015) are incorporated in the strategic plan (Sucahyo *et al*., 2016) for KM implementation, which is supported by organisational procedures (Tan and Wong, 2015) and infrastructures (Zack, 1999).

Since strategic KM enhances a firm's capability to sustain its competitive advantages (Ferreira *et al*., 2018), top executives are recommended to formulate appropriate KM strategies to survive in the current dynamic environment (Zack, 1999). However, many top executives (Zack, 1999) are struggling to understand the link between KM and business strategies (Heisig *et al*., 2016). The paucity of understanding of KM-business strategies relationship impedes the success of KM and organisation development (Heisig *et al*., 2016). It is helpful to comprehend the roles of KM in business strategies

by the alignment of KM strategies with business strategies (Dabic and Kiessling, 2019; Kianto and Andreeva, 2014) as well as the ultimate linkages of these strategies to the business performance of firms (Heisig *et al*., 2016).

Strategic KM can increase organisational performance because strategic KM emphasises the management of intellectual resources to create unique value which enables the firms to craft their business strategies based on the knowledge-driven advantages they own over their rivals and make strategic decisions of sharing, creation, application of knowledge following the overall strategic objectives of the firms (Inkinen *et al.*, 2015). Nevertheless, the relationships between strategic KM and organisational performance are still inclusive in the present empirical studies. Inkinen and Kianto (2014) showed that strategic KM did not affect market performance. Likewise, Lee and Choi (2010) indicated that the relationship between strategic KM and sales performance was insignificant while Sucahyo *et al*. (2016) did not find any relationship between strategic KM and non-financial performance. Additionally, Kianto and Andreeva (2014) reported strategic KM could not affect cost deduction, but strategic KM positively affected organisational efficiency and revenue improvement. Other studies also claimed a positive relationship between the strategic KM and overall organisational performance existed directly (Kamhawi, 2012) or indirectly (Fong and Chen, 2012). Likewise, positive relations between strategic KM and financial performance were also reported by Claver-Cortés *et al*. (2018), Hartono *et al*. (2016) and Mandal and Bagchi (2016). Despite the empirical evidence being inconclusive, there are theoretical grounds for believing that knowledge-based strategizing will help organisations to effectively steer their value creation processes. Therefore, it assumes:

$H3_1$: Strategic KM is positively related to overall organisational performance.

$H3_2$: Strategic KM is positively related to financial performance.

$H3_3$: Strategic KM is positively related to non-financial performance.

National culture shapes KM activities (Hussinki *et al.*, 2017; Liu *et al.*, 2019). Strategic KM focuses on visions, missions, and the objectives of KM in organisations might be affected by cultural contexts. In small power distance societies, employees can bargain with their supervisors about the objectives that are needed to achieve; so, management by objective in small power distance societies is feasible (Hofstede, 2001). In contrast, employees are affected by the formal authorities and do not have the flexibility to reason with their supervisors (Hofstede, 2001). Then, strategic KM in small power distance societies is more easily implemented and the effects of strategic KM on organisational performance tends to be obvious in small power distance societies. Therefore, it assumes:

$H_{PDc1:}$ The strategic KM-overall organisational performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDc2:}$ The strategic KM-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDc3:}$ The strategic KM-non-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

Collective societies believe in collective decisions while individualistic societies emphasise individual decisions (Hofstede, 2001). Strategic KM focuses on communicating KM strategies to all employees and involve employees in the decision-

making process. Employees in collective societies might be easily motivated by such participation in strategic KM. Therefore, it assumes:

$H_{ICc1:}$ The strategic KM-overall organisational performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICc2:}$ The strategic KM-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICc3:}$ The strategic KM-non-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

Similarly, communication on the mutual mission and vision on KM among employees is easier in feminine societies because employees in feminine societies are milder than in masculine societies in terms of dealing with conflicts (Hofstede, 2001). By contrast, employees in masculine societies tend to 'bargain and fight' to solve problems (Hofstede, 2001) which is inefficient in communication. Thus, it assumes that:

$H_{FMc1:}$ The strategic KM-overall organisational performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMc2:}$ The strategic KM-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMc3:}$ The strategic KM-non-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

Strategic KM offers a clear direction of KM initiatives for organisations; however, managers in strong uncertainty avoidance societies pay more attention to business

operation while managers in weak uncertainty avoidance societies are more strategy-oriented (Hofstede, 2001). Strategic KM is likely more popular in weak uncertainty avoidance societies than in strong uncertainty avoidance societies because managers in weak uncertainty avoidance societies tend to offer clear strategic KM planning. Therefore, it assumes:

$H_{UAc1:}$ The strategic KM-overall organisational performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

$H_{UAc2:}$ The strategic KM-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

$H_{UAc3:}$ The strategic KM-non-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

Knowledge is highly valued in long-term oriented societies, for instance, people have a wide appreciation of knowledge and education in long-term orientated societies while people look to folk wisdom and witchcraft in short-term oriented societies (Hofstede, 2011). As such, organisations are more likely to strategically manage their knowledge to sustain their market position in long-term oriented societies. Therefore, it assumes:

$H_{LSc1:}$ The strategic KM-overall organisational performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSc2:}$ The strategic KM-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSc3:}$ The strategic KM-non-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

Strategic KM focuses on improving organisational competence based on KM (Cabrilo and Dahms, 2018; Kianto and Andreeva, 2014). It is crucial to completely communicate KM strategies to employees to develop the right path to successful KM. As people more actively participate in social activities and communication in indulgence-oriented societies (Hofstede *et al*., 2010), strategic KM might be strengthened in indulgence-oriented societies. Therefore, it assumes:

$H_{IRc1:}$ The strategic KM-overall organisational performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

$H_{IRc2:}$ The strategic KM-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

$H_{IRc3:}$ The strategic KM-non-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

As firms in developed countries are more familiar with modern business operations, they are more likely to initiate strategic KM planning. In addition, more firms are in the service industries and create more wealth in developed nations. It is more critical for firms to better implement KM in developed countries to sustain their competitive advantages. Therefore, strategic KM is more likely to be initiate in developed countries than in developing countries, and it assumes:

$H_{Ee1:}$ The effect of strategic KM-overall organisational performance relationship in developed countries is larger than in developing countries.

$H_{Ee2:}$ The effect of strategic KM-financial performance relationship in developed countries is larger than in developing countries.

$H_{Ee3:}$ The effect of strategic KM-non-financial performance relationship in developed countries is larger than in developing countries.

Organisations in service industries need a more vivid strategic KM plan to guide KM activities since service industries are characterised as intensive knowledge exchange and application industries. Appropriate strategic KM emphasises providing clear objectives of KM which align with and support business objectives. With such well-designed strategic KM, organisations in service industries can succeed in creating value. In addition, empirical evidence showed that the impacts of strategic KM on organisational performance are strengthened in service industries (Kianto and Andreeva, 2014). Therefore, it consumes:

$H_{Ic1:}$ The effect of strategic KM-overall organisational performance in service industries is larger than in manufacturing industry.

$H_{Ic2:}$ The effect of strategic KM-financial performance relationship in service industries is larger than in manufacturing industry.

$H_{Ic3:}$ The effect of strategic KM -non-financial performance relationship in service industries is larger than in manufacturing industry.

Figure 2-4 illustrates the relationships between strategic KM and organisational performance as well the moderating effects of national culture, economy and industry on these relationships.

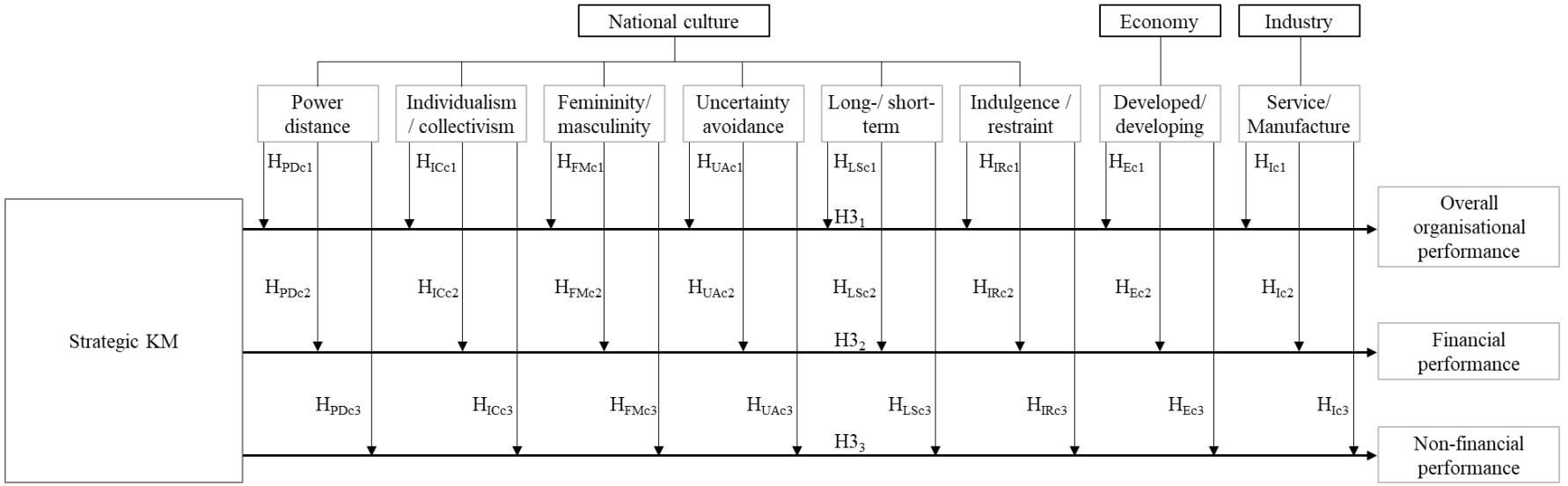


Figure 2-4: Research model Ⅲ strategic KM and organisational performance

2.2.4 Research model IV: KM strategies and organisational performance

It is critical for firms to choose an appropriate management strategy to ensure the success of KM initiatives (Oluikpe, 2012). Hansen *et al.* (1999) identified two KM strategies, namely, knowledge codification and personalisation (Sánchez *et al.*, 2015). A knowledge codification strategy is concerned with the capturing, codification, and storage of explicit knowledge with the application of technologies (Choi and Lee, 2012), whereas a knowledge personalisation strategy focuses on increasing communication of tacit knowledge through the interaction and social networks of people (Oluikpe, 2012).

The different choices of KM strategies, such as knowledge codification and personalisation, affect the firm performance because clear KM strategies align with business strategies and support knowledge processes. For instance, the knowledge codification strategy emphasises sharing, transferring, and storage explicit knowledge. Organisations can easily apply the codified knowledge they need; therefore, the efficiency of knowledge application is enhanced leading to better organisational performance. On the other hand, the knowledge personalisation strategy complements the knowledge codification strategy by supporting employees to share, transfer and apply tacit knowledge. The tacit knowledge is extremely difficult to transform into documents. Once the organisations successfully establish channels for tacit knowledge sharing and application, organisations can improve their capability to obtain more economic value. Previous literature review studies made no attempt to assess the effectiveness of the knowledge codification strategy and knowledge personalisation strategy on organisational performance. The strength of the knowledge codification strategy-organisational performance relationships and the knowledge personalisation strategy-organisational performance relationships have not been treated with a meta-

analysis technique. Comprehensive understanding of the relationships between knowledge codification strategy and organisational performance and the relationships between knowledge personalisation strategy and organisational performance remain obscure due to inconsistent findings of these relations in previous studies. Therefore, it is necessary to systematically review previous KM strategies studies, aiming to provide new knowledge on the KM strategies-organisational performance relationships.

Most empirical studies about KM strategies and organisational performance followed the knowledge strategy classification of Hansen *et al*. (1999), but the findings are conflicting. Ling (2013) reported the knowledge codification strategy positively or negatively moderated the intellectual capital-organisational performance relationships depending on the dimensions of intellectual capital, while Liao (2011) showed the relationship between the knowledge codification strategy and overall organisational performance was significantly negative. In addition, Bavarsad *et al.* (2015) found that the knowledge codification strategy did not affect the internal performance of firms.

In contrast, several studies showed a positive relationship between the knowledge codification strategy and financial performance of firms (Chen and Huang, 2014; Payal *et al*., 2016; Cohen and Olsen, 2015). In addition, Hasan *et al.* (2015), Shehata (2015) and Shahzad *et al.* (2016) claimed that the knowledge codification strategy positively affected the overall organisational performance of the firms. Cohen and Olsen (2015) also found a significant relationship between the knowledge codification strategy and non-financial performance of the firms while Kim *et al.* (2014) argued that the effectiveness of knowledge codification on non-financial performance depends on information system maturity and environmental knowledge intensity. Based on the

grounded theory that the knowledge codification strategy helps organisations better managing their knowledge, it assumes:

$H4_{11}$: The knowledge codification strategy is positively related to overall organisational performance.

$H4_{12}$: The knowledge codification strategy is positively related to financial performance.

$H4_{13}$: The knowledge codification strategy is positively related to non-financial performance.

Similarly, the knowledge personalisation strategy-organisational performance relationships are still controversial. The relationship between the knowledge personalisation strategy and financial performance of the firms was stated to be insignificant (Ling, 2013; Payal *et al*., 2016) or even negative (Hartono *et al.*, 2018). Insignificant relationship between knowledge personalisation strategy and overall organisational performance was also reported (Shahzad *et al*., 2016); while it was suggested that the knowledge personalisation strategy-financial performance relationship (Chen and Huang, 2014) and the knowledge personalisation strategy-overall performance relationship (Hasan *et al*., 2015) were positive. Though some insignificant relationships were reported, personalised knowledge actually helps organisations to effectively create value, therefore, it assumes:

$H4_{21}$: The knowledge personalisation strategy is positively related to overall organisational performance.

$H4_{22}$: The knowledge personalisation strategy is positively related to financial performance.

$H4_{23}$: The knowledge personalisation strategy is positively related to non-financial performance.

National culture affects the way people share and acquire knowledge. For instance, knowledge tends to be shared openly and equally with everyone in small power distance societies; in contrast, knowledge is held by supervisors to keep their power in large power distance societies (Hofstede, 2001). Then, the knowledge codification strategy and the knowledge personalisation strategy can be easily implemented in organisations in small power distance regions, but neither the knowledge codification strategy nor the knowledge personalisation strategy is popularized because the knowledge flow in high power distance regions is mainly limited to the top hierarchy. Therefore, it assumes:

$H_{PDdc1:}$ The knowledge codification strategy-overall organisational performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDdc2:}$ The knowledge codification strategy-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDdc3:}$ The knowledge codification strategy-non-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDdp1:}$ The knowledge personalisation strategy-overall organisational performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDdp2:}$ The knowledge personalisation strategy-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDdp3:}$ The knowledge personalisation strategy-non-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

There might be differences between individualism and collectivism in terms of knowledge strategies selection. It is unethical to offer benefits to people based on the distance of social relationships in individualistic societies (Hofstede, 2001). Individualists are quite independent in working by themselves. They might be resistant to codify their knowledge for others. People in collective societies are more likely to care about others and are more willing to codify their knowledge for their peers in the same group. Therefore, it assumes:

$H_{ICdc1:}$ The knowledge codification strategy-overall organisational performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICdc2:}$ The knowledge codification strategy-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICdc3:}$ The knowledge codification strategy-non-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

People in collective societies value their social networks and it is normal to be reciprocal to each other due to personal relationships (Hofstede, 2001). People in

collective societies like to work as groups because affiliation in groups improves the collectivists' security (Hofstede, 2001). It is likely that collectivists obtain knowledge from their social networks through more frequently direct conversations compared to individualists. Therefore, it assumes:

$H_{ICdp3:}$ The knowledge personalisation strategy-overall organisational performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICdp3:}$ The knowledge personalisation strategy-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICdp3:}$ The knowledge personalisation strategy-non-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

People are more progressive on career success in masculine societies (Hofstede, 2001) and they are more able to hide knowledge to sustain their performance. In this way, the knowledge codification strategy and the knowledge personalisation strategy might not be easily implemented in masculine societies because employees in masculine societies might lack commitment to sharing their knowledge through knowledge codification and personalisation. Therefore, it assumes:

$H_{FMdc1:}$ The knowledge codification strategy-overall organisational performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMdc2:}$ The knowledge codification strategy-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMdc3:}$ The knowledge codification strategy-non-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMdp1:}$ The knowledge personalisation strategy-overall organisational performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMdp2:}$ The knowledge personalisation strategy-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMdp3:}$ The knowledge personalisation strategy-non-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

Organisations rely on rules to reduce uncertainty, especially in strong uncertainty avoidance regions. Organisations in strong uncertainty avoidance regions are more likely to codify employees' knowledge into manuscripts, documents, and regulations to guide employees' work so that the output of employees can be controlled. On the other hand, organisations are more tolerant to ambiguity in procedures and structures in weak uncertain avoidance regions (Hofstede, 2001); in addition, social relationships within organisations are more important in weak uncertainty avoidance regions (Hofstede, 2001); therefore, employees in these organisations in weak uncertainty avoidance regions are used to transfer knowledge in conversations rather than in documents. Thus, it assumes:

$H_{UAdc1:}$ The knowledge codification strategy-overall organisational performance relationship will be strengthened in strong uncertainty avoidance regions and weakened in weak uncertainty avoidance regions.

$H_{UAdc2:}$ The knowledge codification strategy-financial performance relationship will be strengthened in strong uncertainty avoidance regions and weakened in weak uncertainty avoidance regions.

$H_{UAdc3:}$ The knowledge codification strategy-non-financial performance relationship will be strengthened in strong uncertainty avoidance regions and weakened in weak uncertainty avoidance regions.

$H_{UAdp1:}$ The knowledge personalisation strategy-overall organisational performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

$H_{UAdp2:}$ The knowledge personalisation strategy-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

$H_{UAdp3:}$ The knowledge personalisation strategy-non-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

In long-term oriented societies, pursuing knowledge embeds people's beliefs and concentrates on developing long-term reciprocal social networks (Hofstede *et al*., 2010). In addition, as perseverance is believed to be important in long-term oriented cultures (Hofstede *et al*., 2010), people can still codify their knowledge even if the knowledge codification processes are time-consuming and boring in restrained societies. Such cultural characteristics of long-term orientation facilitate knowledge codification and personalisation. Therefore, it assumes:

$H_{LSdc1:}$ The knowledge codification strategy-overall organisational performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSdc2:}$ The knowledge codification strategy-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSdc3:}$ The knowledge codification strategy-non-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSdp1:}$ The knowledge personalisation strategy-overall organisational performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSdp2:}$ The knowledge personalisation strategy-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSdp3:}$ The knowledge personalisation strategy-non-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

People more value their social networks and treasure their friendships in indulgence-oriented regions, while friendships are less important in restraint-oriented culture networks (Hofstede *et al*., 2010). With a wide range of social networks, people more easily obtain and share knowledge in indulgence-oriented societies via knowledge personalisation. On the other hand, people more possible depend on codified knowledge,

such as manuals and guidelines to obtain knowledge because more people are introverts. In addition, the knowledge codification processes are somewhat tedious in general, but it might be not a challenge in restrained cultures as leisure is not important in restrained culture, whereas people might spend more time on entertainment than knowledge codification in indulgence-oriented societies. Therefore, it assumes:

$H_{IRdc1:}$ The knowledge codification strategy-overall organisational performance relationship will be strengthened in restraint-oriented regions and weakened in indulgence-oriented regions.

$H_{IRdc2:}$ The knowledge codification strategy-financial performance relationship will be strengthened in restraint-oriented regions and weakened in indulgence-oriented regions.

$H_{IRdc3:}$ The knowledge codification strategy-non-financial performance relationship will be strengthened restraint-oriented regions in and weakened in indulgence-oriented regions.

$H_{IRdp1:}$ The knowledge personalisation strategy-overall organisational performance relationship will be strengthened indulgence-oriented regions and weakened in restraint-oriented regions.

$H_{IRdp2:}$ The knowledge personalisation strategy-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

$H_{IRdp3:}$ The knowledge personalisation strategy-non-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint-oriented regions.

Developed countries are characterised as places where the state-of-art technologies are developed and widely applied. The knowledge codification strategy needs IT to store codified knowledge while the knowledge personalisation strategy needs IT to facilitate tacit knowledge transfer. More advanced technologies can help these KM activities more efficiently and effectively. Therefore, it consumes:

$H_{Edc1:}$ The effect of the knowledge codification strategy-overall organisational performance relationship in developed countries is larger than in developing countries.

$H_{Edc2:}$ The effect of the knowledge codification strategy-financial performance relationship in developed countries is larger than in developing countries.

$H_{Edc3:}$ The knowledge codification strategy-non-financial performance relationship in developed countries is larger than in developing countries.

$H_{Edp1:}$ The effect of the knowledge personalisation strategy-overall organisational performance relationship in developed countries is larger than in developing countries.

$H_{Edp2:}$ The effect of the knowledge personalisation strategy-financial performance relationship in developed countries is larger than in developing countries.

$H_{Edp3:}$ The knowledge personalisation strategy-non-financial performance relationship in developed countries is larger than in developing countries.

Firms in the service industries are more likely to depend on knowledge resources to compete. The more knowledge the firms possess and create, the more competitive advantages they can formulate. Service firms might invest more in knowledge creation to develop more new intangible products while manufacturing firms might focus on knowledge application and codification to sustain their product quality during the

manufacturing processes. Choi and Lee (2003) supported the view that the knowledge codification strategy is more effective to impact on the performance of manufacturing companies while the knowledge personalisation strategy is more effective to affect the performance of service companies. Therefore, it assumes:

$H_{Idc1:}$ The effect of the knowledge codification strategy-overall organisational performance relationship in manufacturing industry is larger than in service industries.

$H_{Idc2:}$ The effect of the knowledge codification strategy-financial performance relationship in manufacturing industry is larger than in service industries.

$H_{Idc3:}$ The effect of the knowledge codification strategy-non-financial performance relationship in manufacturing industry is larger than in service industries.

$H_{Idp1:}$ The effect of the knowledge personalisation strategy-overall organisational performance relationship in service industries is larger than in manufacturing industry.

$H_{Idp2:}$ The effect of the knowledge personalisation strategy-financial performance relationship in service industries is larger than in manufacturing industry.

$H_{Idp3:}$ The effect of the knowledge personalisation strategy-non-financial performance relationship in service industries is larger than in manufacturing industry.

Figure 2-5 and Figure 2-6 and displays research model IV-1 and IV-2, respectively.

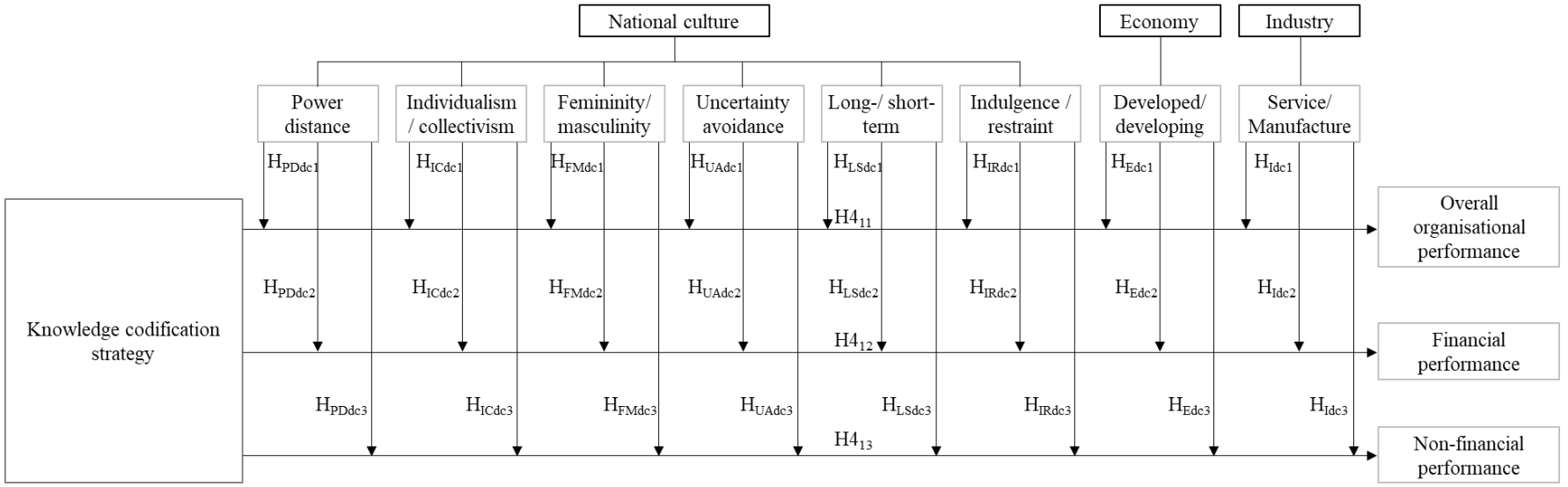


Figure 2-5: Research model IV-1 the knowledge codification strategy and organisational performance

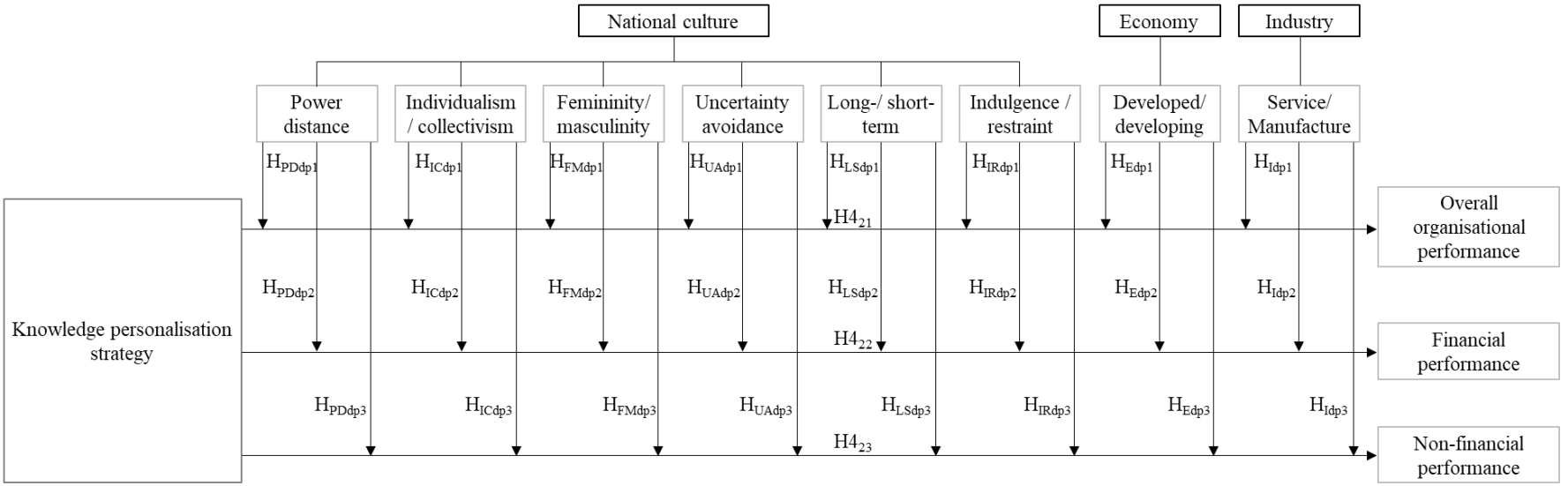


Figure 2-6: Research model IV-2 the knowledge personalisation strategy and organisational performance

2.2.5 Research model V: KM-supportive information technologies (IT) and organisational performance

KM-supportive IT refer to tools, platforms, and infrastructures developed by IT that are applied to support knowledge processes in organisations. It is a widespread belief that IT drive KM (Caputo *et al.*, 2019; Lee *et al.*, 2019) because the adoption of IT can eliminate divisions in communication that happen among employees in the organisations (Gold *et al.*, 2001). With the support of advanced IT, KM projects are more likely to be successful (Davenport *et al*., 1998). Tanriverdi (2005) suggested that KM-supportive IT render organisations with competitive advantages over their rivals because knowledge processes, such as knowledge creation, retention, sharing, and application can be easily realised with the help of IT (Alavi and Leidner, 2001). Clearly, organisations more successfully implementing and applying KM-supportive IT tend to efficiently support knowledge processes that can produce better outcomes.

There has been an increasing amount of literature on the relationships between KM-supportive IT and organisational performance (Gupta and Chopra, 2018; Inkinen, 2016). However, the links between the KM-supportive IT and organisational performance remain ambiguous due to the mixed empirical findings. For instance, whilst a negative relationship between the KM-supportive IT and financial performance was disclosed by Shih *et al*. (2009), other studies demonstrated a positive relationship between the KM-supportive IT and financial performance of firms (Roldán *et al*., 2014; Valdez-Juárez *et al*., 2018). As a consequence, a meta-analysis study is helpful to reduce the heterogeneity of these contradictory findings on the KM-supportive IT-organisational performance relationships.

In addition, previous meta-analysis studies focused on the IT investment-firm financial performance relationship (Lim *et al.*, 2011; Lim *et al.*, 2004) or the IT resource-firm performance relationship (Liang *et al.*, 2010) or the IT-strategic alignment (Gerow *et al.*, 2014) or research design issues (Kohli and Devaraj, 2003). A consolidation of KM-supportive IT and organisational performance is missing in the IT and KM literature which makes it difficult to comprehend the role of KM-supportive IT in affecting organisational performance. Therefore, it is vital to obtain the true effect of KM-supportive IT on organisational performance, which can improve the understanding of the role of IT in KM for both academicians and practitioners.

There is a large volume of published studies to date that have explored the interdependency between KM-supportive IT and organisational performance. However, Matin and Sabagh (2015) found that the KM-supportive IT and overall organisational performance was negatively associated, while meanwhile Han and Wang (2012) and Li and Han (2008) argued that IT applications for KM would not lead to better overall organisational performance. Likewise, Payal *et al*. (2016) also found that KM-supportive IT did not affect organisational performance. In contrast, others showed a positive relationship between the KM-supportive IT and overall organisational performance (Choe, 2016; Kamhawi, 2012; Kroh *et al.*, 2018; Mageswari *et al*., 2017; Pee *et al*., 2010; Wang *et al.*, 2007; Wong and Wong, 2011). According to the majority of positive relationships found in literature, it assumes:

$H5_1$: KM-supportive IT are positively related to overall organisational performance.

Scholarly works have also examined the relationships between the KM-supportive IT and firm financial performance; however, the findings are still inconsistent. In other words, scepticism about the effect of KM-supportive IT on firm financial performance

still prevails. For example, Inkinen and Kianto (2014), Shih *et al*. (2009), Yang *et al.* (2009), Chen and Liang (2011), and Payal *et al*. (2016) reported an insignificant relationship between the KM-supportive IT and financial performance. Additionally, Andreeva and Kianto (2012) reported the KM-supportive IT negatively affected firm financial performance. Conversely, more research by previous studies (Chen and Huang, 2014; Jain and Moreno, 2015; Kamath *et al*., 2016; Maiga *et al.*, 2013; Lee and Lee, 2007; Roldán *et al*., 2014; Soto-Acosta *et al.*, 2018; Tanriverdi, 2005; Vaccaro *et al.*, 2010; Valdez-Juárez *et al*., 2018) concluded that the KM-supportive IT-firm financial performance relationship was significantly positive. Therefore, it assumes:

$H5_2$: KM-supportive IT are positively related to financial performance.

In the same vein, the relationship between the KM-supportive IT and non-financial performance provokes controversy as well (Chen and Liang, 2011). Mills and Smith (2011), Lee *et al.* (2008), and Yang *et al*. (2009) reported a negative relationship between KM-supportive IT and non-financial performance. In contrast to their conclusions, many other researchers, such as Lee *et al*. (2012), Lee and Lee (2007), Liang *et al.* (2013), Mageswari *et al*. (2017), Maiga *et al*. (2013), and Valdez-Juárez *et al*. (2018) revealed a positive relationship between the KM-supportive IT and non-financial performance. Therefore, it assumes:

$H5_3$: KM-supportive IT are positively related to non-financial performance.

IT adoption is influenced by national culture (Hofstede, 2001). For instance, small power distance regions usually use more technologies with modest expectations of benefits the technology, while large power distance regions expect to obtain more benefits through technology application (Hofstede, 2001). KM technologies are widely

used in organisations nowadays, but it takes time to obtain a return on investment. It supposes that small power distance regions use more KM technologies without considering short-term payoff, therefore, it assumes:

$H_{PDe1:}$ The KM-supportive IT-overall organisational performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDe2:}$ The KM-supportive IT-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDe3:}$ The KM-supportive IT-non-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

Modes of IT adoption are different between individualists and collectivists. Individualists are more likely to apply the state-of-the-art techniques using their own judgement while collectivists like to follow others' choices of using new technologies (Lee *et.al*, 2013). Similarly, KM-supportive IT approaches are more likely to be widely and quickly implemented in individualistic societies, but KM-supportive IT approaches are implemented when organisations find that competitors have applied these technologies in collective societies. It is possible that the late adoption of KM-supportive IT makes organisations in collective societies less competitive; therefore, it assumes:

$H_{ICe1:}$ The KM-supportive IT-overall organisational performance relationship will be weakened in collective regions and strengthened in individualistic regions.

$H_{ICe2:}$ The KM-supportive IT-financial performance relationship will be weakened in collective regions and strengthened in individualistic regions.

$H_{ICe3:}$ The KM-supportive IT-non-financial performance relationship will be weakened in collective regions and strengthened in individualistic regions.

Gender differences in the application of IT are obvious. For instance, female students were less familiar with IT while male students more enjoyed using computers and had fewer problems with softwares (Reinen and Plomp, 1997). Attitudes towards information sharing more strongly affected information sharing intention of females than males (Lin and Wang, 2020). In addition, female owners of SMEs were less likely to know what IT they needed and less familiar with IT application (Orser and Riding, 2018). In addition, females were restricted in applying IT (Elnaggar, 2008). Such inequality about IT application might be more obviously manifested in masculine societies than feminine societies. Likely, KM-supportive IT approaches are better adopted in feminine societies than in masculine societies, therefore, it assumes:

$H_{FMe1:}$ The KM-supportive IT-overall organisational performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMe2:}$ The KM-supportive IT-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMe3:}$ The KM-supportive IT-non-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

Initiating IT projects is always accompanied by uncertainty because the application IT might change employees' working habits. For instance, IT (e.g. internet and Teletext)

is less applied in strong uncertainty avoidance societies but widely applied in weak uncertainty avoidance societies (Hofstede, 2001). Thus, it assumes:

$H_{UAe1:}$ The KM-supportive IT-overall organisational performance relationship will be weakened in weak uncertainty avoidance regions and strengthened in strong uncertainty avoidance regions.

$H_{UAe2:}$ The KM-supportive IT-financial performance relationship will be weakened in weak uncertainty avoidance regions and strengthened in strong uncertainty avoidance regions.

$H_{UAe3:}$ The KM-supportive IT-non-financial performance relationship will be weakened in weak uncertainty avoidance regions and strengthened in strong uncertainty avoidance regions.

As people in long-term oriented societies focus on acquiring knowledge and expanding their social networks, KM-supportive IT might be more widely applied in long-term societies because it facilitates the knowledge process and communication. It is reasonable to presume that the impacts of long-term orientation are stronger on the KM-supportive IT-organisational performance relationship. Therefore, it assumes:

$H_{LSe1:}$ The KM-supportive IT-overall organisational performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSe2:}$ The KM-supportive IT-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSe3:}$ The KM-supportive IT-non-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

People use IT tools, such as email and internet, for contacts with others in indulgence-oriented societies than in restrained societies (Hofstede *et al*., 2010). In addition, more people might apply KM-supportive IT to facilitate their knowledge-seeking behaviour in indulgence-oriented societies since they are more familiar with IT applications in indulgence-oriented societies. Therefore, it assumes:

$H_{IRe1:}$ The KM-supportive IT-overall organisational performance relationship will be strengthened indulgence-oriented regions and weakened in restraint regions.

$H_{IRe2:}$ The KM-supportive IT-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint regions.

$H_{IRe3:}$ The KM-supportive IT-non-financial performance relationship will be strengthened in indulgence-oriented regions and weakened in restraint regions.

Firms in developed countries are active knowledge creators who have led technological development for hundreds of years. Most of the typical KM-supportive IT, such as internet-based tools including wiki, portals, yellow pages; communication tools including emails, instant messengers; databases including document management systems, knowledge repositories, search engines; knowledge creation and analytic tools including artificial intelligence, big data analytics and so forth are developed by experts from developed countries. Firms in developed countries are more familiar in applying these techniques to enhance their efficiency in managing knowledge. In addition, firms in developing counties may not adopt state-of-the-art technologies as they cannot access the technologies due to limited resources and capabilities. Therefore, it assumes:

$H_{Ee1:}$ The effect of KM-supportive IT-overall organisational performance relationship in developed countries is larger than in developing countries.

$H_{Ee2:}$ The effect of KM-supportive IT-financial performance relationship in developed countries is larger than in developing countries.

$H_{Ee3:}$ The KM-supportive IT-non-financial performance relationship in developed countries is larger than in developing countries.

Organisations request higher speeds to integrate knowledge and are better in applying IT for KM in the service industries. For instance, IT related service firms outperformed firms in the manufacturing industry in terms of KM technologies implementation and application (Chawla *et al*., 2010). In addition, more KM projects were undertaken in consultancy firms than in the manufacturing firms (Chase ,1997). Such evidence shows that firms in the service industries have more opportunities to apply KM than in the manufacturing industry. Therefore, it assumes:

$H_{Ie1:}$ The effect of KM-supportive IT-overall organisational performance relationship in service industries is larger than in manufacturing industry.

$H_{Ie2:}$ The effect of KM-supportive IT-financial performance relationship in service industries is larger than in manufacturing industry.

$H_{Ie3:}$ The effect of KM-supportive IT-non-financial performance relationship in service industries is larger than in manufacturing industry.

Figure 2-7 shows the relationships between knowledge-supportive IT and organisational performance and its impacts in different contexts.

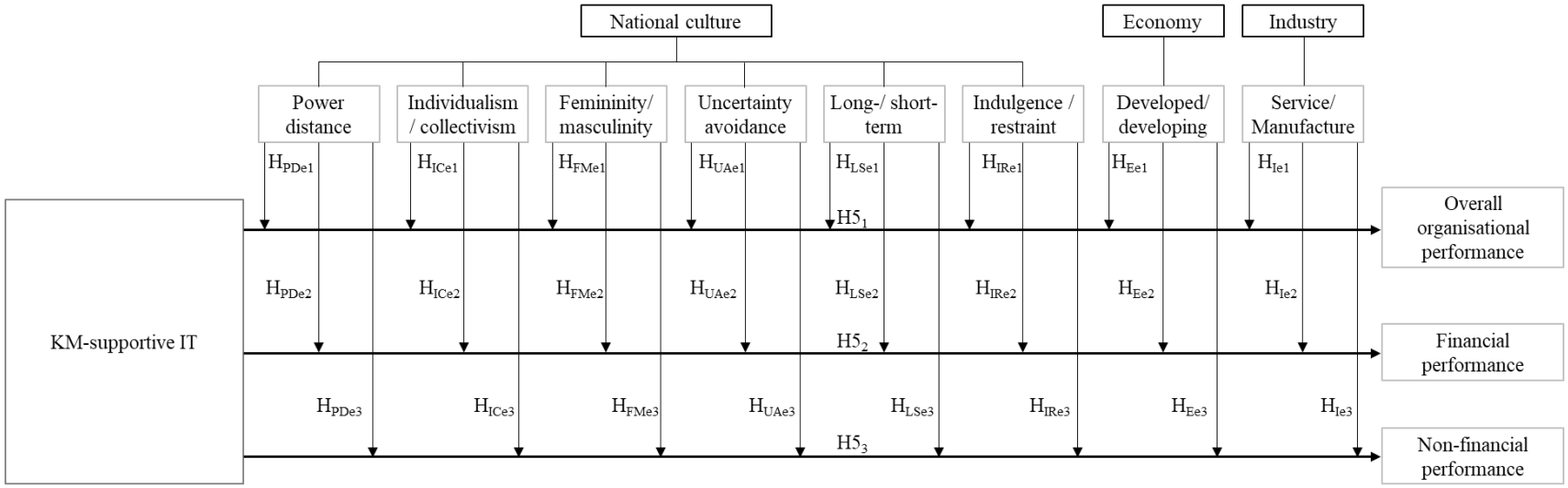


Figure 2-7: Research model V KM-supportive IT and organisational performance

2.2.6 Research model VI: Organisational learning and organisational performance

Organisational learning highlights the importance of knowledge (Popova-Nowak and Cseh, 2015) in organisational settings (Fiol and Lyles, 1985; Valaski *et al.*, 2012; Wang and Ahmed, 2003). Organisational learning *is defined as a dynamic learning process for knowledge creation, acquisition and integration to develop resources and capabilities of organisations* (Pérez López *et al.,* 2005). Research into organisational learning was initiated in the late 1950s and intense debates on different aspects of organisational learning have been provoked since the late 1980s (Easterby-Smith *et al.*, 2000) as organisations realised that learning is important for their survival. For instance, fierce debates on the level of analysis of organisational learning (Beeby and Booth, 2000), cognition versus behaviour of organisational learning (Bapuji and Crossan, 2016) and organisational learning versus learning organisation (Beeby and Booth, 2000) have been conducted over the past decades, appearing to reach consensus or lie dormant, but new territorial debates concerning learning and knowledge are ongoing (Easterby-Smith *et al*., 2000).

The resource-based view claims that firms still can earn money if they can learn from others, but cannot achieve competitive advantages (Peteraf and Barney, 2003). Organisational learning aims to reach competitive advantages through learning to create, acquire and integrate knowledge rather than simply imitating others. This underlying perception of organisational learning is consistent with the knowledge-based view, which highlights the importance of efficient and effective knowledge creation and integration. This argument is supported by the fact that the relationship between KM and organisational learning tended to overlap and be mixed when similar underlying concepts and issues were found in these two fields (Easterby-Smith *et al*., 2000). The

concepts of organisational learning parallels KM in the knowledge-based economy and both organisational learning and KM interact with each other in terms of practices (Wang and Ahmed, 2003). Obvious examples of these findings are that organisational learning and KM studies emerged in (Castaneda *et al.*,2018) and combined with each other (Jain and Moreno, 2015)*;* such as the study of Hussinki *et al*. (2017). On the other hand, earlier literature reviews concerning KM practices (e.g., Gupta and Chopra, (2018); Inkinen, (2016)) neglected the fact that organisational learning is also an important KM practice. In hence, it is time to expand the scope of KM practices by adding organisational learning into the research model.

Retrospect to the organisational learning studies, it is obvious that organisational learning can contribute to positive organisational outcomes, such as performance improvement, competitive advantage enhancement and sustainability development (Oh, 2019; Wang and Ahmed, 2003) because organisational learning facilitates knowledge creation, acquisition, and integration and enables organisations to manage their knowledge in an effective and efficient manner. Based on this premise, many scholars tested the relationship between organisational learning and organisational performance in an empirical way. However, the literature on organisational learning-organisational performance relationships lacks clarity regarding the inconsistent empirical findings and thereby affects the generalisability on organisational learning-organisational performance literature.

Although some research has been carried out on reviewing organisational learning literature from particular aspects, such as implications of organisational learning for human resource development (Dixon, 1992), empirical studies in organisational learning (Bapuji and Crossan, 2016), networks in inter-organisational learning (Beeby

and Booth, 2000), historical debates in organisational learning (Easterby-Smith *et al*., 2000), organisational learning in public organisations (Rashman *et al.*, 2009), IT (Robey *et al.*, 2000) and ontologies (Valaski *et al*., 2012) in organisational learning, conceptual frameworks of organisational learning (Wang and Ahmed, 2003), the current studies failed to use a synthesised approach to examine the organisational learning-organisational performance relationships. To fill this research gap, this study tries to consolidate these relationships with the meta-analysis approach to expand our knowledge on organisational learning and its benefits.

A wide body of literature has investigated organisational learning-organisational performance relationships, but the findings are still nebulous. Rodríguez Antón *et al.* (2016) and Khan *et al*. (2015) pinpointed that the relationship between organisational learning and overall organisational performance was insignificant. Similarly, Lichtenthaler (2009) argued that transformative and exploratory learning was not related to overall organisational performance. Contrary to the above-mentioned findings, most studies maintained that the organisational learning-overall organisational performance relationship was positive (Chien and Tsai, 2012; Choe, 2016; Hussain *et al.*, 2018; Hu, 2013; Kharabsheh *et al.*, 2014; Kim *et al.*, 2010; Lin *et al*., 2013; Noruzy *et al*., 2013; Rao *et al.*, 2015; Real *et al.*, 2014; Ruiz-Mercader *et al*., 2006). Therefore, it assumes:

$H6_1$: Organisational learning is positively related to overall organisational performance.

Shih *et al*. (2009) and Lin *et al*. (2013) showed that there was an insignificant relationship between organisational learning and financial performance of firms, but much of the literature conclusively demonstrated that the organisational learning-financial performance relationship was positive (Bueno *et al.*, 2010; Feng *et al*., 2014;

Forés and Camisón, 2011; García-Morales *et al.*, 2007; García-Morales *et al*., 2008; Inkinen and Kianto, 2014; Lee and Huang, 2012; Lee and Lee, 2007; Li *et al.*, 2011; Maiga *et al*., 2013; Pett and Wolff, 2016; Rhodes *et al.*, 2008; Roxas *et al.*, 2014; Sirén *et al.*, 2012). Therefore, it assumes:

$H6_2$: Organisational learning is positively related to financial performance.

The relationship between organisational learning and non-financial performance is consistent from a relatively minor body of literature (Lee *et al*., 2012; Lee and Lee, 2007; Maiga *et al*., 2013; Salge and Vera, 2013; Ngah *et al.*, 2016). Therefore, it assumes:

$H6_3$: Organisational learning is positively related to non-financial performance.

Learning is cultural conditioned because people's values and behaviour toward learning are different across nations (Hofstede, 2001). For example, education systems are quite different between small power distance societies and large power distance societies. Students depend on teachers to learn in large power distance societies while students are more active in learning and communication in small power distance societies (Hofstede, 2001). These learning habits continue through people's lives. Therefore, people in small power distance societies tend to more actively participate in organisational learning whilst people in large power distance societies are more likely to learn by the force of supervisors. Then, it assumes:

$H_{PDf1:}$ The organisational learning-overall organisational performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDf2:}$ The organisational learning-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

$H_{PDf3:}$ The organisational learning-non-financial performance relationship will be strengthened in small power distance regions and weakened in large power distance regions.

Distinctions in learning behaviour between individual societies and collective societies are obvious. Employees are associated through in-groups and learning is more active within the groups in collective societies, while employees favour learning by themselves in individualistic societies. Organisational learning emphasises knowledge acquisition, integration, commitment and training among employees. Employees in collective societies are more likely to learn with others; therefore, it assumes:

$H_{ICf1:}$ The organisational learning-overall organisational performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICf2:}$ The organisational learning-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

$H_{ICf3:}$ The organisational learning-non-financial performance relationship will be strengthened in collective regions and weakened in individualistic regions.

Genders inequality occurs in organisations. For example, women were paid less (Gagliardi *et al.*, 2019) and had less learning opportunities than men in many organisations (Johansson and Abrahamsson, 2018). Such inequality is strengthened in masculine societies as males are more powerful while males and females are more equal

in job and learning opportunities in feminine societies (Hofstede, 2011). Therefore, it assumes:

$H_{FMf1:}$ The organisational learning-overall organisational performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMf2:}$ The organisational learning-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

$H_{FMf3:}$ The organisational learning-non-financial performance relationship will be strengthened in feminine regions and weakened in masculine regions.

Learning behaviour is also affected by the extent of uncertainty avoidance. For instance, students like structured lectures and seek specific answers in strong uncertainty avoidance regions while students favour open-ended learning and discussion in weak uncertainty avoidance regions (Hofstede, 2001). Such differences in learning between different regions can also be reflected when organisations initiate organisational learning. Employees in strong power distance regions like to obtain direct answers from others without deep thinking while employees in weak power distance regions like to obtain answers via dialogue and discussion when they face complex questions. Effective dialogue and discussion are critical for organisational learning; thus, organisational learning might be more effective on organisational performance in weak uncertainty avoidance regions. Therefore, it assumes:

$H_{UAf1:}$ The organisational learning-overall organisational performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

$H_{UAf2:}$ The organisational learning-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

$H_{UAf3:}$ The organisational learning-non-financial performance relationship will be strengthened in weak uncertainty avoidance regions and weakened in strong uncertainty avoidance regions.

The importance of learning is embedded in the norm of long-term oriented societies (Hofstede *et al*., 2010). People believe that payoffs of learning can be materialised later in long-term orientated societies. Organisational learning is a dynamic learning process to create, acquire and integrate knowledge for capability development, which echoes the belief in long-term oriented societies. Therefore, it assumes:

$H_{LSf1:}$ The organisational learning-overall organisational performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSf2:}$ The organisational learning-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

$H_{LSf3:}$ The organisational learning-non-financial performance relationship will be strengthened in long-term oriented regions and weakened in short-term oriented regions.

People from indulgence-oriented societies are generally willing to realise their desires in terms of joy and entertainment. They show a higher extent to the importance of fun and a lower extent to the importance of commitment (Hofstede *et al*., 2010). People in indulgence-oriented societies lack commitment to learning. For instance, students with

higher indulgence scores are less likely to enrol on online courses than students in restrained societies (Gómez-Rey *et al*., 2016). In addition, learning is less fun than playing games, in most cases. It is more likely that people might feel bored if the learning activities are not appealing. Emphasising happiness in education can be easily observed in these indulgence-oriented societies. On the other hand, people would like to learn even if learning were not as interesting as games since people are unlikely to thirst for entertainment in a restrained culture. Therefore, it assumes:

$H_{IRf1:}$ The organisational learning-overall organisational performance relationship will be weakened indulgence-oriented regions and strengthened in restraint-oriented regions.

$H_{IRf2:}$ The organisational learning-financial performance relationship will be weakened in indulgence-oriented regions and strengthened in restraint-oriented regions.

$H_{IRf3:}$ The organisational learning-non-financial performance relationship will be weakened in indulgence-oriented regions and strengthened in restraint-oriented regions.

The education systems in developed countries are more advanced than in developing countries. A higher percentage of people are well educated, and poor people are more likely to have opportunities to learn in developed countries than in developing countries. Organisational learning is easier to be deployed with a higher portion of well literate employees as these employees have been trained on how to learn since their childhood in developed countries than in developing countries. It is reasonable to suppose that organisational learning might be more effective in developed countries, therefore, it assumes:

$H_{Ef1:}$ The effect of organisational learning-overall organisational performance relationship in developed countries is larger than in developing countries.

$H_{Ef2:}$ The effect of organisational learning-financial performance relationship in developed countries is larger than in developing countries.

$H_{Ef3:}$ The effect of organisational learning-non-financial performance relationship in developed countries is larger than in developing countries.

Learning is critical for employees who work in service industries. Such employees should have superior capabilities to acquire, share, and integrate knowledge into the service products. Organisational learning provides a channel for employees to be quickly equipped with the knowledge that they need through continuous learning and training. As the role of organisational learning is more vital in service industries, firms can achieve better performance if they provide effective learning mechanisms. Therefore, it assumes:

$H_{If1:}$ The effect of organisational learning-overall organisational performance relationship in service industries is larger than in manufacturing industry.

$H_{If2:}$ The effect of organisational learning-financial performance relationship in service industries is larger than in manufacturing industry.

$H_{If3:}$ The effect of organisational learning-non-financial performance relationship in service industries is larger than in manufacturing industry.

Research model about organisational learning-organisational performance relationships as well as the moderating effects of contextual factors on these relationships is shown in Figure 2-8.

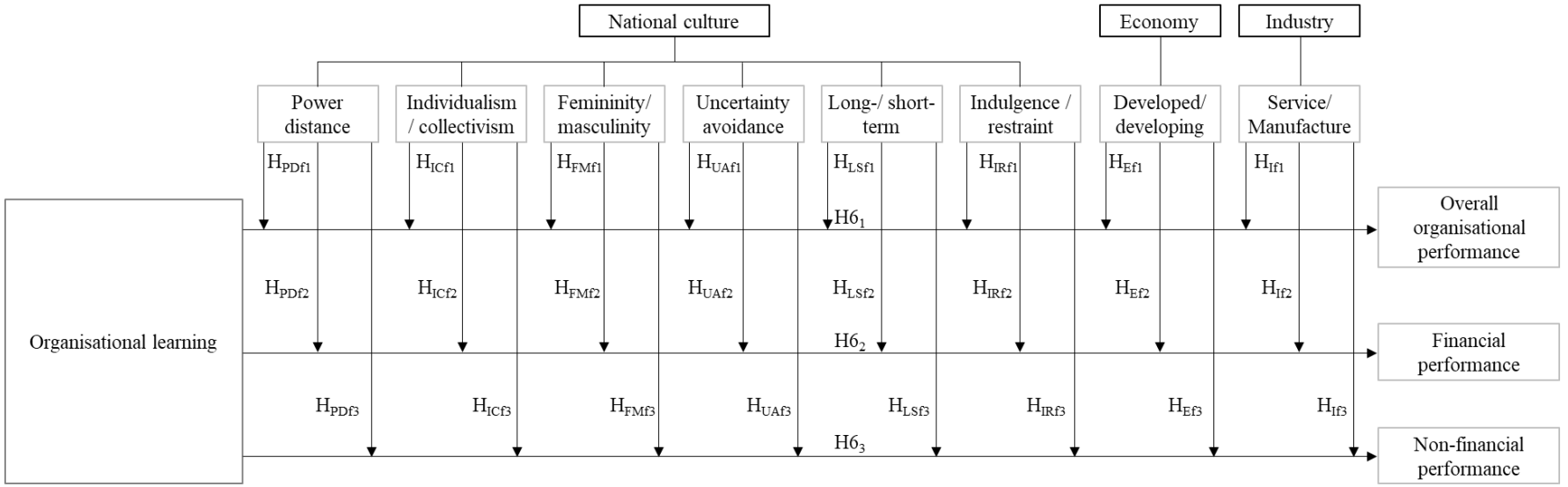
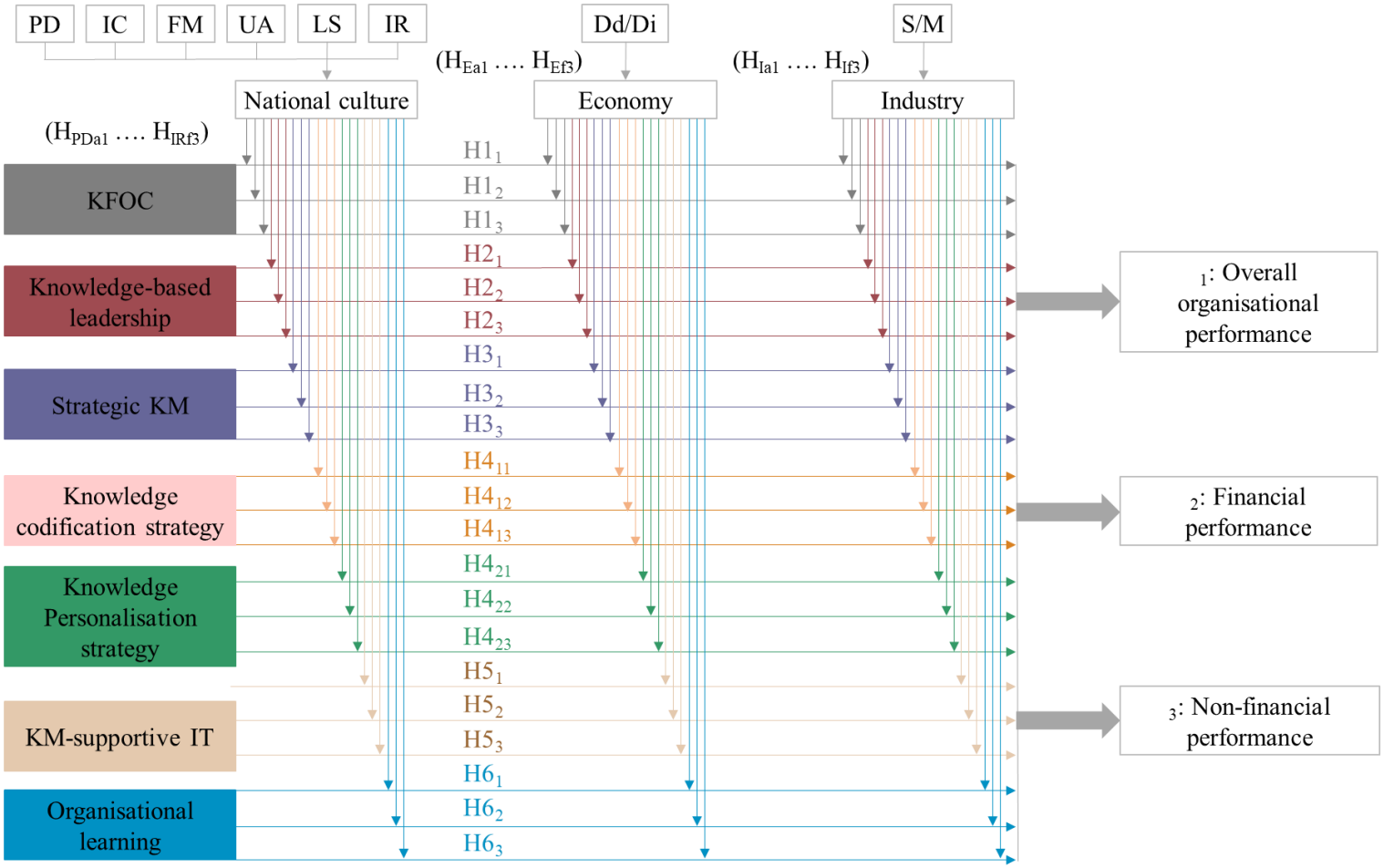


Figure 2-8: Research model VI organisational learning and organisational performance

2.3 Chapter Summary

This chapter began by introducing the basic concepts of the knowledge, knowledge-based view, KM practices, and KM in different contexts. It went on to postulate seven research models concerning the direct links between KM practices (namely, KFOC, knowledge-based leadership, strategic KM, KM strategies, KM-supportive IT, and organisational learning) and organisational performance (overall organisational performance, financial performance, and non-financial performance) as well as the moderating effects of contextual factors: national culture, economy, and industry on these relationships. As shown in Figure 2-9, twenty-one hypotheses were proposed to test the main effects of KM practices and organisational performance, and 126 hypotheses, twenty-one hypotheses and twenty-one hypotheses were formulated to examine the moderating effects of national culture, economies, and industries on the KM practices-organisational performance relationships, respectively. The next chapter describes the meta-analysis method which enables a better understanding of the causal relationships in a comprehensive approach.



Note: PD: power distance; IC: individualism versus collectivism; FM: masculinity versus femininity; UA: uncertainty avoidance; LS: long-versus short-term orientation; IR: indulgence- versus restraint- orientation; Dd: developed economy; Di: developing economy; S: service industries; M: manufacturing industry

Figure 2-9: Summary of the research models

Chapter 3 Research methodology

Research gaps on the KM practices-organisational performance relationships were identified and six research models with 189 hypotheses were formulated as discussed, in the preceding chapter. This chapter describes the research methods and procedures applied in this study. The first section introduces the meta-analysis methods. The second section moves on to elaborate on the advantages of meta-analysis and the third section portrays the seven steps that are generally implemented in a meta-analysis. A summary of this chapter is provided at the end.

3.1 Introduction of meta-analysis approach

It is common that scientific literature is clustered and filled with replicated studies of the same phenomena (Cooper and Hedges, 2009). However, these similar studies are rarely exact duplications of each another because they differ somewhat in methods, measures, or samples (Noel and Todd, 2012). In such cases, dissimilar results of these identical studies are often obtained (Cooper and Hedges, 2009). In addition, the imperfect replications of the studies make it challenging to understand the meaningful variances caused by the difference in sampling and causes lead to the variances if any exist (Noel and Todd, 2012). An appropriate solution to these challenges is to systematically review the evidence from a number of identical studies and combine the findings of interest in order to draw conclusions (Noel and Todd, 2012). Many types of literature reviews, such as narrative reviews, critical reviews, systematic reviews, and meta-analysis aimed to provide such a solution to accumulate knowledge (Hempel, 2020). Meta-analysis is the most appropriate solution for heterogeneous empirical studies because it can carry out systematic syntheses of the empirical results and provide an integrative statistical power for the mixed empirical findings. Detailed

comparisons of these literature review methods can be found in Table 3-1.

Table 3-1: Literature review methods (Hempel, 2020, p. 4)

SN	Literature review method
1	*Traditional literature review*, also named *narrative review*, aims to provide an overview or an introduction to a research field.
2	A *critical review* generally applies research findings to deliver specific information.
3	A *systematic review* conforms to standardized research procedures and systematically collate existing studies.
4	A *meta-analysis* statistically synthesises empirical results across studies based on a *systematic review* of the literature.

The meta-analysis, alternately called research synthesis, research review, or systematic review [6] (Cooper, 2017), is a methodological and statistical method (Noel and Todd, 2012) aiming at producing empirical knowledge about general associations, particularly causal relationships (Matt and Cook, 2009) which provides a statistical analysis of a large set of empirical results from individual studies to create conclusive generalisations (Cooper and Hedges, 2009; Hartung *et al.*, 2008; Noel and Todd, 2012) by correcting errors and biases of the quantitative scholarly works (Schmidt and Hunter, 2015). Nowadays, meta-analysis is a ubiquitous empirical research approach applied in thousands of studies (Cooper and Hedges, 2009) in educational (Higgins, 2018), social, and medical sciences (Cheung, 2015) that promote the progression of science (Noel and Todd, 2012). However, current literature review studies on the associations between KM practices and organisational performance, such as by Inkinen (2016), Gupta and Chopra (2018) are flawed because these studies could not provide empirical evidence on the KM practices-organisational performance relationships by adopting the

[6] Actually, there are minor differences among these terms, but there is not an agreement on where the differences are meaningful (Cooper and Hedges, 2009). This study adopted the term meta-analysis to emphasise this quantitative analytical method used in literature review studies.

systematic review method, therefore, this meta-analytic study provides an exciting opportunity to advance our knowledge of KM practices in a more specific way.

3.2 Advantages of meta-analysis

Meta-analysis enjoys massive advantages compared with narrative literature reviews. Meta-analysis centres on consolidating separate past empirical research by drawing holistic conclusions (generalisations) from many individual examinations which address similar or related hypotheses (Cooper, 2017). Thus, the meta-analysis can offer knowledge about the magnitude of the effect, but narrative literature reviews cannot (Noel and Todd, 2012). It also can reduce the bias of developing a consensus from analysing several single studies (Livingston *et al.*, 2008) by offering an integrative view of the research domain (Rosenthal and Dimatteo, 2001). Particularly, it can improve the precision of the statistics and achieve a definitive conclusion especially when the sample sizes of these combined single studies are small (Livingston *et al*., 2008; Matt and Cook, 2009). Meta-analysis improves the primary data application because it consists of those studies that report insignificant results (Rosenthal and Dimatteo, 2001). Meta-analysis can explore knowledge by investigating the characteristics of the individual studies. For instance, subgroup analysis for categorical moderators (Noel and Todd, 2012) in the meta-analysis can be applied to examine whether the moderators are related to the effect sizes. Thus, the meta-analysis approach was chosen to obtain further in-depth knowledge based on a wealth of empirical research concerning KM practices-organisational performance relationships.

3.3 The procedures of meta-analysis

The meta-analysis follows scientific principles and processes (Cooper and Hedges, 2009; Noel and Todd, 2012). The present study employs the seven stages proposed by

Cooper (2017) to conduct the meta-analysis because these seven steps are comprised of principal tasks that need to be complemented. In this way, an unbiased description of the cumulative state of evidence on the assumed propositions can be produced by the research synthesis (Cooper, 2017). For each step, Cooper (2017) identified the research questions asked and their primary role in the synthesis with which a researcher can conform to undertaking their meta-analysis. A brief introduction about these seven steps is given below.

- Step one: Problem formulation

This step identifies the research scope of interest which aims to target relevant empirical evidence or hypotheses tested in the meta-analysis. It defines the variables and relationships of the meta-analysis as well. Problem formulation of this study is introduced in section 4.1.

- Step two: Literature search

After identifying the research problems and defining the variables, step two focuses on the procedures of retrieving targeted studies from the literature. Researchers should first decide on the databases and keywords used for locating the studies. The retrieving strategy and processes of this study are outlined in section 4.2.

Step three: Study information collection

Once the studies are located, researchers should devise an inclusion and exclusion criteria to decide which information should be selected in the meta-analysis. This information is recorded in a coding guide. Then complying with this coding guide, coders codify each study. Codification of selected studies of this research is described in section 4.3.

- Step four: Study quality evaluation

This step evaluates the research methods and the implementation of the primary studies to exclude studies that are not conducted in accordance with the desired methods for solving the research questions. Assessment of quality of the selected studies is specified in section 4.4.

- Step five: Study results analysis and integration

This step shows the procedures to summarise and combine the empirical results of the coded separated studies. Researchers should choose an appropriate method to consolidate the empirical results across the studies and select a plausible effect size metric. The average effect sizes and confidence interval should be reported. In addition, homogeneity of effect sizes should be tested. The study design characteristics and other essential features of the studies might be tested as potential moderators of the examined relationships. The fixed-effect model and random-effects model are two popular statistical models in the meta-analysis (Borenstein *et al*., 2010). The fixed effect model assumes all the studies in a meta-analysis have a common effect size, whereas the random-effects model supposes the true effects from a distribution and is evaluated the mean of this distribution (Borenstein *et al.*, 2010). The fixed-effect model can be applied only when all the identical studies share the same true effect size (Borenstein *et al*., 2010). Therefore, a random-effects model is used to integrate the effect sizes because the effect sizes and sampling frameworks of the selected studies are varied; second, the selected studies are in the published literature are more plausible to apply the random-effects model rather than the fixed-effect model and the conclusions can be generalised to more situations (Borenstein *et al*., 2010). Comprehensive effect sizes, corresponding intervals, Z-value, p-value are presented. Then the publication bias is examined. The publication bias, also named as ‘file drawer’ problem, is the probability that the studies included in a meta-analysis cannot represent all the identical studies,

because studies reporting insignificant or unexpected results cannot be easily published (Noel and Todd, 2012). Fail-safe N test is commonly used to detect 'file-drawer' problems. In the seminal paper of Rosenthal (1979), Rosenthal proposed an indicator named as failsafe N to indicate the number of excluded studies with zero effect size that can converse present the conclusion of a meta-analysis. Rosenthal also suggested a rule of thumb to detect publication bias with the failsafe N parameter. The 'file-drawer' problem does not exist if failsafe N is larger than (or equals to) 5k+10 (k is the number of studies in a meta-analysis) because it is unlikely to have so many unpublished studies in the file drawers (Rosenthal, 1979). Nowadays, Rosenthal's suggestion is widely applied to detect publication bias in meta-analysis (Becker, 2005; Mullen *et al.*, 2001; Noel and Todd, 2012). Thus, this study adopted the fail-safe N test to assess the publication bias issue.

After evaluating the publication bias, it moves on to the homogeneity test of the meta-analysis. Q-statistic and I^2 (Huedo-Medina *et al.*, 2006; Noel and Todd, 2012) can be used to assess the heterogeneity of the meta-analysis while the Q-statistic only shows whether the meta-analysis study is heterogeneous or not, but I^2 can quantify the extent of the heterogeneity (Noel and Todd, 2012). I^2 explains the portion of between-study variance to total variance (Higgins and Thompson, 2002), while the total variance is comprised of between- and within-study variance (Noel and Todd, 2012). In general, $I^2 \approx 25$, $I^2 \approx 50$, and $I^2 \approx 75$ denote low, medium, and high heterogeneity, respectively ($I^2 = 0$ means homogeneity) (Huedo-Medina *et al*., 2006; Noel and Todd, 2012). Therefore, this study applied I^2 to evaluate heterogeneity of the meta-analysis.

It is also essential to explore potential moderators that can interpret the heterogeneity. Categorical moderators aim to explore possible reasons for heterogeneity by comparing groups of studies classified by their characteristics. If the heterogeneity between

different categories (represented by $Q_{between}$) is significant, then it can be concluded that these groups differ in their effect sizes and the characteristic (categorical moderator) is related to the effect sizes (Noel and Todd, 2012). In this study, national culture, economy, and industry are identified as categorical moderators to evaluate their impacts on the KM practices-organisational performance relationships. Detailed empirical results can be found in Chapter five.

- Step six: Evidence explanation

This step aims to summarise the accumulative empirical evidence of the meta-analysis concerning its strength, generalisability, and limitations. Step six of this study is explained in detail in Chapter six.

- Step seven: Results presentation

Step seven shows information and knowledge in a research synthesis that authors should report to their readers. This thesis follows meta-analysis reporting standards proposed by Cooper (2017), which includes title, abstract, introduction, methods, results, and discussion section. Table 3-2 shows the seven phases of meta-analysis and answers for the research questions in each step of the present study.

Table 3-2: Research synthesis steps

SN	Steps in research synthesis	Corresponding section/ chapter	Specification of step in this study
1	Formulating the problem	Section 4.1	**Variable definition and targeted relationships** *Primary variables:* KM practices (KFOC, knowledge-based leadership, codification, personalisation, strategic KM, KM-supportive IT, and organisational learning), organisational performance (overall organisational performance, financial performance, and non-financial performance) *Moderators*: national culture, economy, and industry *Relationship*: KM practices-organisational performance relationships, effects of the contextual factors on the KM practices-organisational performance relationships
2	Searching the literature	Section 4.2	**Sources**: Scopus database, **Terms**: knowledge management, performance
3	Gathering information from studies	Section 4.3	**Data collection items:** study information: author, year, effect size, sample size, KM practices measurement, organisational performance

SN	Steps in research synthesis	Corresponding section/ chapter	Specification of step in this study
			measurement, country(region), and industry
4	Evaluating the quality of studies	Section 4.4	**Effect size selection criteria**: (a) Studies that report correlation coefficient or other statistic values can be used to calculate correlation coefficient; or (b) studies applied surveys to collect data and test the relationships between KM practices and organisational performance
5	Analysing and integrating the outcomes of studies	Chapter 5	**Estimation method**: Random-effects model was used to calculate main effects; sub-group analysis was used to test moderating effects; False-safe N was used to test publicantion bia, while I^2 was used to examine homogeneity.
6	Interpreting the evidence	Chapter 6	Discussing the cumulative empirical evidence in terms of its strength, generality, and limitations.
7	Presenting the results	The whole thesis	Showing what it should show in a meta-analysis

3.4 Chapter summary

This chapter lays out the procedures and methods used in this study in an introduction of the meta-analysis in the first section, introducing advantages of the meta-analysis in the second section, and the procedures of the meta-analysis approach in the final section. The relationships between KM practices and organisational performance are inconsistent, which exerts difficulty to understand the power of KM practices on organisational performance. In addition, the majority of current studies regarding KM practices and organisational performance have made no attempt to consider the impacts of contextual factors. Fortunately, the meta-analysis approach firstly can consolidate the mixed empirical findings and secondly specify the influence of contextual factors. Therefore, the meta-analysis approach was applied to gain a detailed understanding of KM practices-organisational performance relationships as well as the moderating effects of contextual factors on these relationships in this research. The chapter below presents the procedures of how this meta-analysis study was implemented, with the steps described in section 3.3.

Chapter 4 Research implementation

Having introduced the meta-analysis approach in the previous chapter, this chapter begins by formulating the research problems, articulating the relationships as well as the definitions of the variables. It is crucial to select the literature thoroughly in completing the meta-analysis research (Cooper, 1998), so the second section depicts the search strategy and paper selection procedures in greater detail. The third section addresses ways of selecting information on the studies and the final section discusses the quality of the studies assessment. A chapter summary is presented at the end.

4.1 Problem formulation (Step one)

The relationships between KM practices (e.g., KFOC, knowledge-based leadership, knowledge codification and personalisation strategy, strategic KM, KM-supportive IT, and organisational learning) and organisational performance (e.g., overall organisational performance, financial performance, and non-financial performance) were sought, as well as examining the impacts of the contextual factors (national culture, economy, and industry) on these relationships, which were postulated in section 2.2 in detail. The definitions of the examined variables are fundamental to undertake paper selection which are mainly introduced in this section.

4.1.1 Primary variables

Aiming to resolve the research questions, ten primary variables, namely, KFOC, knowledge-based leadership, knowledge codification strategy and personalisation strategy, strategic KM, KM-supportive IT, organisational learning, overall organisational performance, financial performance, and non-financial performance

were identified, based on the outlined research models.

4.1.2.1 KFOC

Organisational culture influences organisations' views and practices about KM. The KFOC is embedded in organisations and facilitates their KM practices of organisations. Studies have regarded KFOC in a variety of ways. For instance, in a KFOC, employees are free to share their knowledge (Boumarafi and Jabnoun, 2008; Chen and Liang, 2011; Chuang *et al*., 2013; Mousavizadeh *et al*., 2015; Mageswari *et al*., 2017) and open to expressing their ideas (Akgün *et al*., 2014; Rezaei *et al*., 2017; Feng *et al*., 2014). Additionally, a learning supportive environment (Khan *et al*., 2015; Lee *et al*., 2012; Moon and Lee, 2014; Mills and Smith, 2011) is created to improve the capabilities of employees. Employees trust (Chen *et al.*, 2011; Kamhawi, 2012; Giampaoli and Ciambotti, 2016; Lee *et al*., 2012; Noh *et al*., 2014) and smoothly collaborate with each other (Chen *et al.*, 2011; Lee, *et al*., 2012; Moon and Lee, 2014; Migdadi *et al*., 2016; Rezaei *et al*., 2017). Employees are also open-minded and encouraged to propose innovative proposals (Samson *et al*., 2017; Santos-Vijande *et al*., 2013). This study defines KFOC as a set of shared values and beliefs in an organisation which enable employees to be passionate to learn, open to innovate, trust, collaborate with, and share knowledge with each other. Therefore, measurements of the organisational culture (climate, environment, values, and belief) that include knowledge sharing, open, trust, learning-oriented, innovative, and collaborative culture for KM were incorporated.

4.1.2.2 Knowledge-based leadership

Knowledge-based leadership refers to the capability of leaders to influence others on

KM processes and activities and is demonstrated in the following behaviour: Senior executives support KM projects (Boumarafi and Jabnoun, 2008; Tang and Lai, 2016), offer enough resources for KM (Boumarafi and Jabnoun, 2008; Kamhawi, 2012; Mousavizadeh *et al*., 2015), and actively participate in KM activities (Lee and Choi, 2010; Pee *et al.*, 2010). Senior executives also encourage (Mageswari *et al*., 2017) KM processes, such as knowledge sharing (Rezaei *et al*., 2017), continuous learning (Boumarafi and Jabnoun, 2008; Jain and Moreno, 2015), and innovation (Akgün *et al*., 2014; Samson *et al*., 2017). Therefore, measurement related to the positive attitudes and active participation of KM of the leaders were considered as knowledge-based leadership.

4.1.2.3 Strategic KM

Strategic KM links KM with organisational business strategies which has clear objectives (Kamhawi, 2012; Lee and Choi, 2010; Tan and Wong, 2015; Sucahyo *et al*., 2016), vision (Claver-Cortés *et al*., 2018; Lee and Choi, 2010), and mission for KM (Pee *et al*., 2010). Organisations also have strategic plans for KM implementations (Kamhawi, 2012; Lee and Choi, 2010; Sucahyo *et al*., 2016) that are thoroughly communicated to employees (Cabrilo and Dahms, 2018; Hussinki *et al*., 2017; Kianto and Andreeva, 2014). Thus, typical strategic KM measurements, such as objectives, vision, mission, and strategic planning for KM as well as KM strategies communication to employees were coded as strategic KM in this study.

4.1.2.4 KM strategies

This research identified two KM strategies, namely, knowledge codification and personalisation. The knowledge codification strategy emphasises codifying knowledge

into formal documents, manuals, checklists, and guidelines (Chen and Huang, 2014; Chiang and Shih, 2011; Cohen and Olsen, 2015; Ling, 2013; Payal *et al*., 2016; Sánchez *et al*., 2015) to support business processes. This codified knowledge is retained in databases and electronic repositories (Choi and Lee, 2012). The above-mentioned measurement related to the knowledge codification strategy was codified in this study.

On the other hand, measurement of the knowledge personalisation strategy centres on knowledge sharing and acquisition through face-to-face interaction of employees, such as informal dialogues, meetings, and discussion (Chen and Huang, 2014; Choi and Lee, 2012; Hasan *et al*., 2015; Ling, 2013; Marouf, 2016; Payal *et al*., 2016; Sánchez *et al*., 2015). This knowledge personalisation strategy-relevant measurement was added in this study.

4.1.2.5 KM-supportive IT

IT is widely used to support KM in organisations. Measurement of KM-supportive IT can be mainly classified into four interwoven groups. The first one focuses on knowledge creation, acquisition, sharing, transferring, searching, retrieving, retention, and application facilitated by IT (Boumarafi and Jabnoun, 2008; Cohen and Olsen, 2015; Huang *et al.*, 2010; Kamhawi, 2012; Kroh *et al*., 2018; Matin and Sabagh, 2015; Wang *et al*., 2007). The second one applies IT for collaboration and communication in organisations (Chen *et al*., 2011; Choe, 2016; Hartono *et al*., 2016; Jain and Moreno, 2015; Kamath *et al*., 2016; Maiga *et al*., 2013; Mills and Smith, 2011; Payal *et al*., 2016). The third one emphasises the role of IT in learning, decision-making, and problem-solving (Fong and Chen, 2012; Kraśnicka *et al.*, 2018; Lee *et al*., 2012; Liang *et al*., 2013; Valdez-Juárez *et al*., 2018). The last one uses IT tools and platforms to facilitate KM (Chong *et al*., 2011; Mageswari *et al*., 2017; Li and Han, 2008; Migdadi,

2009). These interwoven measurements about KM-supportive IT were coded in this research because previous surveys used these measurements to gauge KM-supportive IT.

4.1.2.6 Organisational learning

This work defines organisational learning as a dynamic learning process for knowledge creation, acquisition and integration to develop resources and capabilities of organisations. Therefore, measurements of organisational learning concerning knowledge acquisition (Bueno *et al*., 2010; García-Morales *et al*., 2007; García-Morales *et al*., 2008; Hughes *et al*., 2008; Li *et al*., 2011; Noruzy *et al*., 2013; Shih *et al*., 2009), integration (Rhodes *et al*., 2008), learning (Chien and Tsai, 2012; Forés and Camisón, 2011; Gantasala *et al*., 2010; Huang *et al*., 2010; Lin *et al*., 2013; Rao *et al*., 2015) commitment (Baker and Sinkula, 1999a; Baker and Sinkula, 1999b; Feng *et al*., 2014; Hu, 2013; Hussain *et al*., 2018; Kharabsheh *et al*., 2014; Pett and Wolff, 2016) and training (Lee and Lee, 2007; Sharabati *et al*., 2010; Maiga *et al*., 2013) were included in this study.

4.1.2.7 Organisational performance

The organisational performance was mainly measured in three aspects. The first category applied financial indicators, such as return on investment, sales growth, profitability, return on equity, cash flow, and market share to measure financial performance. The financial performance was coded as ‘F’. The second category emphasised non-financial measurements, such as cost reduction, stakeholders’ satisfaction, time to market, organisational reputation, personnel development, and research and development, which was coded as ‘NF’. The last category combined both

financial and non-financial indicators to measure the overall organisational performance and was coded as ‘OP’ in this study.

4.1.2 Moderator variables

Noel and Todd (2012) suggested two rules to select moderators: the characteristics as moderators are consistently reported in most studies, and these characteristics of the studies are varied. This study adopted three contextual factors: national culture, economy, and industry to evaluate the variances of KM practices-organisational performance relationships due to these contextual factors.

4.1.2.1 National culture

National culture varies from country to country and influences management practices (Hofstede, 1993). National culture, as an important moderator (Hofstede, 1993), is widely used in organisational research (Tsui *et al.*, 2016), such as Wiengarten *et al.* (2011), Kang *et al.* (2018), and Rosenbusch *et al.* (2019).

Six dimensions of Hofstede *et al*‘s. (2010) national culture framework, namely, power distance (PD), individualism versus collectivism (IC), masculinity versus femininity (MF), uncertainty avoidance (UA), long-term orientation versus short-term orientation (LS), and indulgence versus restrained (IR) culture were coded based on the regions where the data of the selected studies were collected.

In this study, each dimension of the national culture was classified into two groups to compare the impacts of national culture on the relationship between the KM practices and organisational performance. The values of each cultural dimension in 104 countries and regions (www.hofstede-insights.com/product/compare-countries/) were sequenced from small values to large values. The mean value (Robie *et al.*, 1998) of each culture

dimension was calculated, and a threshold value which is the closest to the mean value was identified. Two groups were set up by comparing the nation's (or region's) value with the threshold value.

In this way, if the value of power distance is more than 66 (included), the region was marked as 'L', which means the power distance in this region is larger. The others (less than 66) are marked as 'S', which means the power distance is comparatively small in these regions. Similarly, if the value of uncertainty avoidance is above (included) 65, then the regions were marked as 'S', which shows stronger uncertainty avoidance; otherwise, they were marked as 'W', which suggests weaker uncertain avoidance in these regions. The threshold value is 47 (included) to define masculine society (coded as 'M') and if the value that is less than 47 is deemed as feminine (coded as 'F'). Individualism was coded when the value is larger than 38 (code as 'I'); contrarily, the regions were coded as collective societies (coded as 'C'). Long-term and short-term orientation was differentiated by the value of 41. If the value is larger than 41, it was coded as 'L' denoting long-term orientation societies, otherwise is coded as 'S'. A threshold value of 48 was used to identify the indulgence versus restrained culture. If the value of the region is less than 48, then it was marked as 'R', which means the region is in a restrained culture; otherwise, it was marked as 'I'. Detailed classification methods can be found in Table 4-1. National culture classifications are shown in Appendix I.

Table 4-1: National culture classifications

Dimensions	Mean	Threshold value	Rules	Code	Number of regions
Power distance	64.59	66	Large than (included) 66	L	46
			Less than 66	S	58
Individualism vs. collectivism	38.62	38	Less than (included) 38	C	64
			Large than 38	I	40
Masculinity vs. femininity	47.58	47	Less than (included) 47	F	54
			Large than 47	M	50
Uncertainty avoidance	64.11	65	Large than (included) 65	S	53
			Less than 65	W	51
	42.93	41	Large than 41	L	41

Dimensions	Mean	Threshold value	Rules	Code	Number of regions
Long-term vs. short term			Less than (included) 41	S	46
Indulgence vs. restrained	47.99	48	Large than (included) 48	I	41
			Less than 48	R	41

4.1.2.2 Economy

Developed economies, economies in transition, and developing economies are three broad categories to demonstrate the economic status of countries and regions (UN, 2018). The economy was coded as 'developed versus transition versus developing' based on geographic locations where the surveys were conducted. The codification of the economy was done according to *the World Economic Situation and Prospects 2018*, published by the United Nations (2018).

4.1.2.3 Industry

This study identified three main types of industries which the past research sampled, namely, manufacturing, service, and multiple industries. The manufacturing industry makes tangible products while the service industries are mainly comprised of financial services, consultancy services, IT services and other services. The studies examining research models from the manufacturing industry were coded as 'Manufacturing', and the studies collecting data from the service industries were coded as 'Service'. The third group, which conducted surveys across dissimilar industries involving both service and manufacturing, was coded as 'Multiple'.

4.2 Literature search (Step two)

To address the research questions, the Scopus database was used to retrieve research papers. The research adopted a set of primary inclusion criteria to encompass appropriate studies. The primary inclusion criteria are as follows:

- ‘Knowledge management’ and ‘performance’ appear in the title, abstract, or keywords to ensure the studies are related to the KM research field;
- The year of publication was from 1975 to August 2018 (since the term ‘knowledge management’ first appeared in academic publications in 1975 (Serenko and Bontis, 2004));
- Publications were only included in the analysis if they were written in English;
- The study belongs to the field of computer science, engineering, business management and accounting, social science, decision science, economics, econometrics and finance, psychology, arts and humanities, and multidisciplinary;
- The study was empirical and tested the relationships between KM and organisational performance;
- The research model should comprise at least one of KM practices (KFOC, knowledge-based leadership, knowledge codification and personalisation strategy, strategic KM, KM-supportive IT, organisational learning) and at least one type of organisational performance (overall organisational performance, financial performance, and non-financial performance);
- The study should report correlation the coefficient between KM practices and organisational performance or other statistics that can be used to calculate the correlation coefficients between KM practices and organisational performance;
- The study should report the measurement or show clear arguments of KM practices and organisational performance that are qualified for the dataset.

4.2.1 Paper searching

‘Knowledge management’ and ‘performance’ were used to target particular papers if

these words appeared in the title, abstract, or keywords from the Scopus database during the period 1975 and August 2018. 32,496 papers were found from the Scopus database and 31,526 papers were written in the English language. Limited to subjects which are highly related to KM subject, such as computer science; business management and accounting; social science; engineering; decision science; economics, econometrics and finance; psychology; arts and humanities; and multidisciplinary, 24,663 remaining papers were checked according to the content of the abstracts and keywords year by year. Then, 1,474 papers were remaining after excluding 23,189 papers which were not related to the research. Full texts of 136 papers among the 1,474 papers could not be attained, so the content of the remaining 1,338 papers was carefully examined. During this process, six papers were added by checking the references lists of the available papers. Altogether, full texts of 1,344 papers were checked. The paper selection procedures are shown in Table 4-2.

Table 4-2: Paper selection procedures

SN	Selection procedures & criterion	No. of studies left
1	Search knowledge management and performance as keywords in the Scopus database from 1975-2018	32,496
2	Excluded 970 papers that are not in English	31,526
3	Limited in subjects: computer science, engineering, business management and accounting, decision science, social science, economics, econometrics and finance, psychology, arts and humanities, and multidisciplinary	24,663
4	Excluded 23, 189 paper not on the topic after screening abstract and titles year by year	1, 474
5	Excluded 136 unobtainable papers	1,338
6	Added 6 papers by snowballing from references list	1,344
Summary: Full context of 1,344 papers were examined		

4.2.2 Full content screening

After excluding unexpected papers (366 irrelevant papers, 140 non-empirical papers, two non-English language papers, 164 papers without reporting correlation coefficients or other parameters which can be used to calculate correlation coefficients, 173 inappropriate papers on measurement, forty-three papers measuring KM as one

variable, eight sub-item correlations reporting papers, two incorrect correlations reporting papers, two duplicated papers, thirty-four unmatched methodical papers, two papers without showing measurements, twenty-two literature reviews, seventy-nine papers on team performance, forty-seven papers on job performance, and seventy-eight papers on innovation performance), 182 papers were selected for the primary data coding process. Paper selection procedures and exclusion criteria are shown in Table 4-3 and Figure 4-1. After choosing paper from the previous studies, the next step focused on coding the necessary information of these studies, as shown below.

Table 4-3: Paper selection procedures and exclusion criteria

SN	Selection procedures & criterion	No. of studies left
1	Excluded 366 papers that are not on topic	978
2	Excluded 140 papers that are not empirical	838
3	Excluded 2 papers that are not in English	836
4	Excluded 164 papers without reporting correlation coefficient (or other statistics that can be used to calculated correlation coefficient)	672
5	Excluded 173 papers that are out the scope of measurement	499
6	Excluded 43 papers that measured KM as a variable	456
7	Excluded 8 papers that reported sub-item correlations	448
8	Excluded 2 papers that reported incorrect correlations	446
9	Excluded 2 duplicated paper	444
10	Excluded 34 papers with unmatched methods	410
11	Excluded 2 papers without reporting measurement	408
12	Excluded 22 literature reviews	386
13	Excluded 79 papers on team performance	307
14	Excluded 47 papers on job performance	260
15	Excluded 78 papers on KM and innovation performance	182
Summary: 182 papers were left for primary data coding processes		

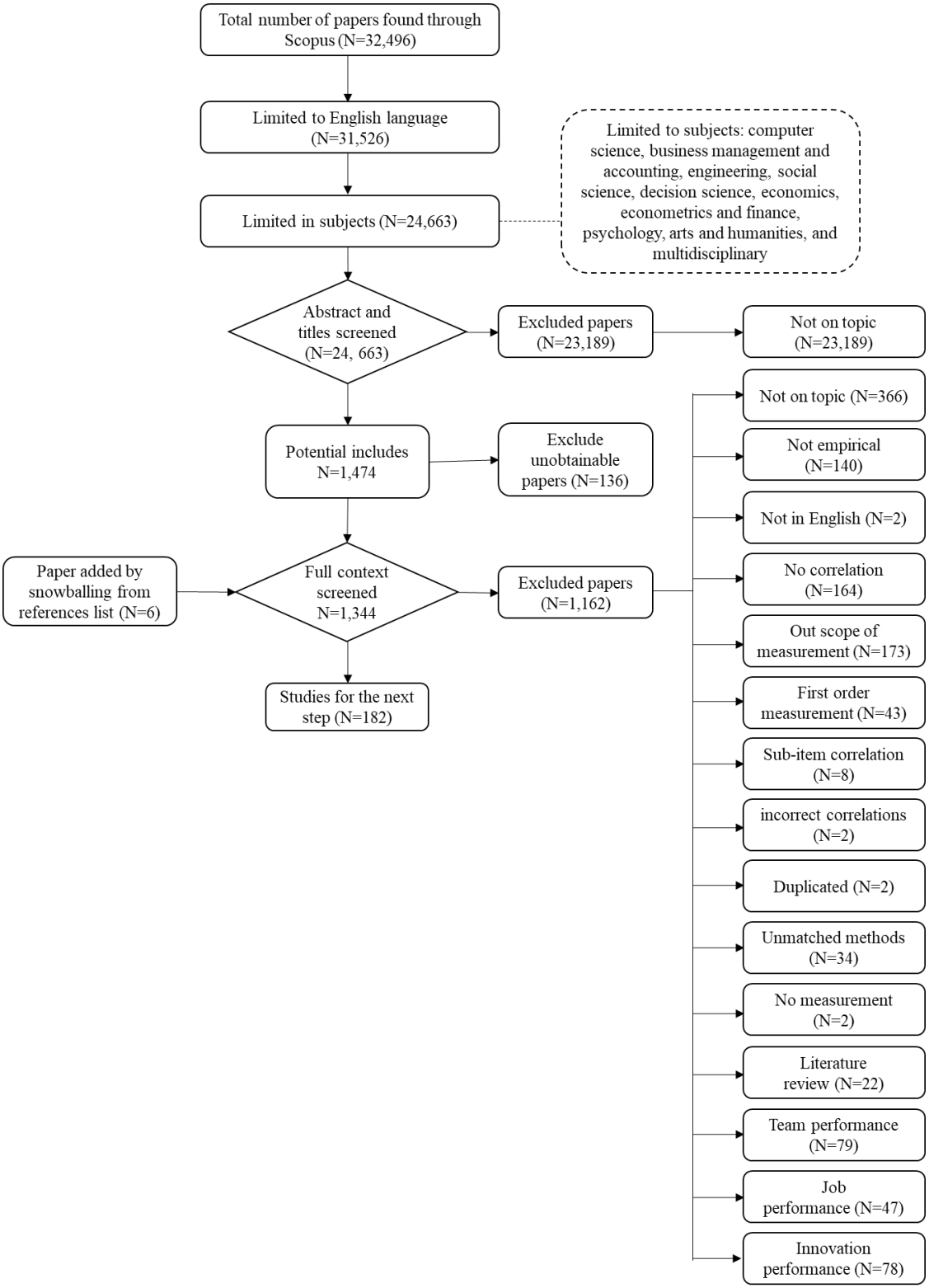


Figure 4-1: Paper selection procedures

4.3 Information collection (Step three)

In an attempt to collate information from 182 initial studies, three rounds of data coding processes were deployed. In the first-round, authors' name, sample size, all variables in

the research model, effect sizes (correlation coefficients between the variables and organisational performance, or other statistics that can be used to calculated correlation coefficients), regions and industries of the data collected were coded. If the variables were KM practices and KM processes, the variables were identified by different colours. In addition, the study's name was filled by rose if the study merely investigated KM processes. Examples of first-round data coding are illustrated in Figure 4-2.

SN	Study	size	Variable 1	Variable 2	Variable 3	Variable 4	Variable 5	Variable 6	Variable 7	Variable 8	Variable 9	Variable 10	Variable 11	Variable 12	Variable 13	V
1	Ağan et al., 2018	102 Istanbul chamber	K generation 0.4	K sharing 0.28 NS	K usage0.27 NS	involvement	expectations	Collaboration .29 NS	quality	cost	market	Metal, machineryand equipment (13), automotive (22), constructionmater				
2	Ajila, 2006	Canada and the US. A study of 50 software intensive organizations	Organization goals	Concern for reuse & exploration	Measurement level	Knowledge reuse	New knowledge exploration	Organizational performance								
3	Akgün et al., 2014	193 Turkey multi	Process management	leadership	Customer focus	Strategic planning	Information &analysis	People management (training) 0.29	Managerial commitment 0.23	Systems perspective 0.19	Openness and experimentation 0.11	Knowledge transfer and integration 0.16	Business innovativeness	Firm financial performance	Firm size	
4	Huang et al., 2010;	170 Taiwan (China)	KSF1: IT infrastructure and system 0.68	KSF2: Open communication 0.44	KSF3: Organizational learning/sharing 0.08	NPDF1: Employee involvement	NPDF2: Design simplification and modular design	ISMF1: Supplier evaluation and selection	ISMF2: Supplier involvement	BPF1: Business competitiveness	BPF2: Manufacturing performance	BPF3: Process efficiency	medium- and large-sized electronicmanufacturing compan			
5	Arunprasad, 2017;	416 software companies India	Staffing	Specific training	Performance evaluation	Performanc e feedback	reward and compensation	employee development	consolidators	transformers	co-inventors	Financial performance	Non-finacial performance			
6	Birasnav, 2014;	119 service firms. Bahrain	1. Age 2. Type 3. Size 4. Capital	5. Contingent reward	6. Passive MBE	7. Active MBE	8. Idealized influence (B)	9. Idealized influence (A)	10. Inspirational motivation	11. Individualized consideration	12. Intellectual stimulation	13. Knowledge acquisition	14. Knowledge transfer	15. Knowledge application	16. Organizationa l Performance	
7	Boon Sin et al., 2015;	Electrical andelectronic 225 Malaysia	[1] Socialization	[2] Externalizatio	[3] Combination	4] Internalizati on	[5] Knowledge	[6] Six Sigma projectsuccess	[7] Organization al performance							
8	Boumarafi and Jabnoun, 2008;	89 UAE	organizational culture, 0.282	Organizational infrastructure 0.262	Technical infrastructure 0.256	Manageme nt support 0.299 +	Reward 0.148 -	Vision clarity 0.258**	Knowledge management financial benefit	Forty-nine of the companies in banking,manufacturing, insurance, investment 8and servicesaccepted to do so and wer						

Figure 4-2: First round data coding examples

After the first-round data coding, as illustrated in Figure 4-1, the remaining 182 papers were classified in detail. Five papers lacked related information (e.g. variable measurement) about the research, so they were excluded. Ten papers were beyond the scope of the desired measurements and were dropped as well. Fifty studies mainly focused on the relationships between KM processes and organisational performance. In addition, the study of Bueno *et al*. (2010) showed the same effect size as García-Morales *et al*. (2007) on organisational learning and financial performance. Therefore, García-Morales *et al*. (2007) was selected because it was published earlier. Finally, 116 papers concerning KM practices and organisational performance were coded in the second round.

Before the second-round data coding process, the author and two experts discussed data coding details and made an agreement on the second-round data coding items and procedures. In this phase, each of the KM practices (KFOC, knowledge-based leadership, strategic KM, knowledge codification and personalisation, KM-supportive IT, and organisational learning) were separately coded according to the principles in section 3.3 in order to set up the data profiles, including authors' name, correlation coefficient (other parameters were transformed into correlation coefficients if possible; Appendix II-i: shows the calculation in detail), sample size, regions and industries of the data collected, measurement of each KM practices, measurement of organisational performance. Examples of second-round data coding are shown in Figure 4-3. Then, the author also discussed any inappropriate studies with other two highly professional and experienced experts in the field in order to reach a consensus about the included studies.

Finally, fifty-six studies were included in the study on KFOC-organisational performance relationships; twenty-two studies were identified for synthesising knowledge-based leadership and organisational performance relationships; fourteen studies investigated strategic KM were selected for meta-analysis; fourteen studies concerning knowledge codification strategy and twelve studies regarding knowledge personalisation strategy were chosen in the analysis, respectively. forty papers examined KM-supportive IT and organisational performance relationships while forty-five studies aimed at revealing relationships between organisational learning and organisational performance. The final category about the 182 papers is shown in Figure 4-4.

Study	Correlation	Sample size	Regions	KM	Performance	Industries	Relationship
Cabrilo and Dahms, 2018;	0.474	101	Serbia	**Strategic management of knowledge (SKM)** To what extent do the following statements on strategic knowledge and competence management apply to your company? (1 = completely disagree, 5 = completely agree) Our company strategy is formulated and updated based on company knowledge and competences Our company strategy addresses the development of knowledge and competences Our company systematically compares its strategic knowledge and competence to that of its competitors Our knowledge and competence management strategy is communicated to employees clearly and comprehensively In our company, the responsibility for strategic knowledge management has been clearly assigned to a specific person	**Market performance (MARKPER)** Compared to other companies in its sector, how do you think your company has succeeded in the following areas over the past year? (1 = very poorly, 5 = very well) Net sales growth Profitability Market share	55 of our companies were from manufacturing and related industries and 46 from service and related industries.	not test. F
Claver-Cortés et al., 2018;	0.341	102	Spain	**Strategic KM** Knowledge dissemination practices 1. the subsidiary's general vision recognises the need and commitment to create and transfer knowledge; 2. the subsidiary's staff are characterised for being enterprising, willing to innovate and committed to sharing their knowledge with other MNC units; and 3. the subsidiary's organisational culture tends to be more open to new initiatives, as well as to experimentation, and oriented to continuous learning. Knowledge storage practices	**MNC performance:** profitability	hightechnology and knowledge-intensive sectors.	+ F through knowledge creation and transfer
Kamhawi, 2012;	0.32	167	Bahraini	**KMS – KM strategy** KMS1 – . . . has specific objectives in its business strategies concerning knowledge management. KMS2 – . . . has specific strategic plans for knowledge management activities in the organization KMS3 – . . . has specific knowledge management initiatives (systems, processes, organizational structure [. . .] etc.) to put KM plans into reality.	**CPF – comparative performance**. Compared to key competitors, my company . . . CPF1 – . . . is more successful CPF2 – . . . has greater market share CPF3 – . . . is growing faster CPF4 – . . . is more profitable CPF5 – . . . is of larger size	11 different business activities: 18 (22 percent) financial services (including banks and insurance companies); 14 (17 percent) trading companies; 13 (16 percent) manufacturing; ten (12 percent) services, eight (10 percent) construction; seven (9 percent) holding companies; five (6 percent) consultation and training; two (2.5 percent) telecommunication; two (2.5 percent) information technology industries as well as one company (1.2%) from the oil and Airlines industrie	+ F through agility

Figure 4-3: Second-round data coding examples

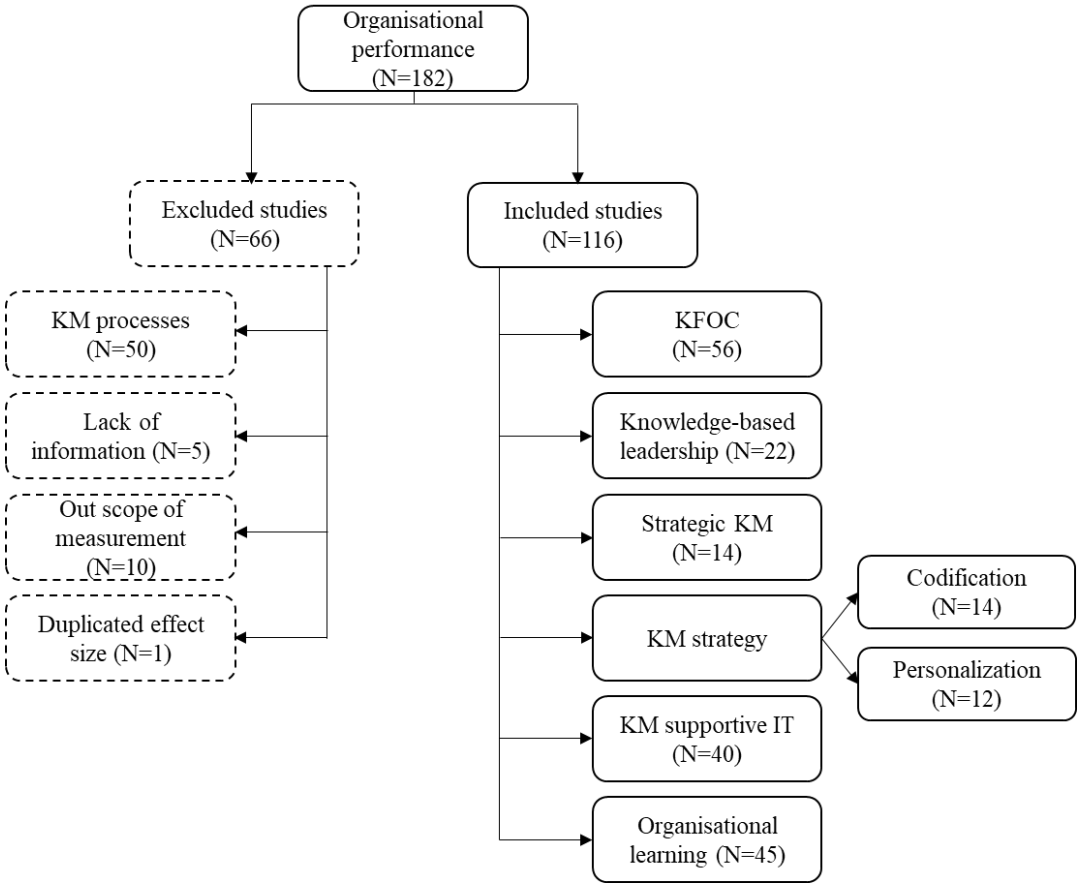


Figure 4-4: Final category of the selected papers

Once the studies were confirmed for the final data analysis, the third-round data coding procedures were initiated which firstly aimed to calculate and combine the correlation coefficients if more than one correlation coefficient was reported to avoid violations of independence assumptions of the meta-analysis for significance test and standard errors calculation (Lim *et al*., 2011). Computing procedures are detailed in Appendix II-ii. Second, the moderators of each empirical tests were coded based on the principles outlined in section 4.1.2. Examples of the third-round coding are illustrated in Figure 4-5.

Study name	Correlation	Sample size	Region	Economies	Industry	Power Distance	Individualism/ collectivism	Masculinity/ femininity	Uncertainty avoidance	Long-term/ short-term	Indulgence/ restrained	Performance type
Akgün et al., 2014-F	0.23	193	Turkey	Developing	Multiple	L	C	F	S	L	I	F
García-Morales et al., 2008-F	0.564	408	Spain	Developed	Multiple	S	I	F	S	L	R	F
Gowen Iii et al., 2009-NF	0.26	376	U.S.	Developed	Service	S	I	M	W	S	I	NF
Inkinen and Kianto, 2014-F	0.245	261	Finland	Developed	Multiple	S	I	F	W	S	I	F
Ismail and Sulong, 2013-OF	0.247	75	Malaysia	Developing	Service	L	C	M	W	S	I	OF
Jain and Moreno, 2015-OF	0.45	205	Indian	Developing	Manufactur	L	I	M	W	L	R	OF
Jiménez-Jiménez et al., 2014-N	0.27	81	Spain	Developed	Service	S	I	F	S	L	R	NF
Lee and Choi, 2010-F	0.016	187	Korea	Developing	Multiple	S	C	F	S	L	R	F

Figure 4-5: Third round data coding examples

4.4 Study quality evaluation (Step four)

This step aims to assess research methods and implementation of primary studies. Researchers might exclude studies before research synthesis or reexamine studies after the research synthesis. A priori exclusion and a posteriori examination of the studies (Cooper, 2017) were adopted. During the full-text screening stage, studies that used undesired research methods, such as algorithm simulation to test the relationship between KM and organisational performance were removed. In addition, studies which neither reported correlation coefficients between KM practices and organisational performance nor reported other statistical values that could be transformed into the needed correlation coefficients were dropped as well. Statistical outliers were left out when the effect sizes were identified. For instance, the calculated correlation coefficients between 'management leadership and support' and organisational performance based on the t-value of Migdadi (2009)'s study varied from -0.071 to 1.000, which were beyond the average correlation coefficient. Thus, the study of Migdadi (2009) concerning knowledge-based leadership and organisational performance was excluded.

4.5 Chapter summary

This chapter presented the meta-analysis implementation procedures regarding problem formulation, literature search, data coding and research quality evaluation. In the next chapter, the analytical procedures and results from the meta-analysis are presented and correspond to the fifth step: study results analysis and integration. In addition, the sixth step: evidence explanation is elaborated in Chapter 6.

Chapter 5 Empirical results

Having shown the research procedures administered for this study in Chapter 4, this section of the thesis moves on to display the results of the meta-analysis which emerged from empirical tests of the hypotheses postulated in Chapter 2. Section one to section six present descriptive statistics, main effect analysis, publication bias analysis, homogeneity test, and moderating effect analysis of the KFOC-organisational performance relationships, the knowledge-based leadership-organisational performance relationships, the strategic KM-financial performance relationship, the KM strategies-organisational performance relationships, the KM-supportive IT-organisational performance relationships, and organisational learning-organisational performance relationships, respectively. A summary of the findings is presented at the end of this chapter.

5.1 KFOC and organisational performance

Three types of organisational performance measurements were identified from the literature, namely, financial performance, non-financial performance, and overall organisational performance. Thus, three meta-analysis studies were developed based on the relationships between KFOC and different types of organisational performance. In total, sixty-eight effect sizes were obtained from fifty-six studies that examined the relationships between KFOC and organisational performance. Thirty of them investigated the relationship between KFOC and overall organisational performance, while fourteen effect sizes of thirteen studies focused on the KFOC-financial performance relationship, and twenty-four effect sizes from twenty-three studies evaluated relations between KFOC and non-financial performance. This section

describes the meta-analysis results of the KFOC-organisational performance relationships.

5.1.1 KFOC and overall organisational performance

5.1.1.1 Descriptive statistics

Table 5-1 shows descriptive statistics of thirty studies which investigated the relationship between KFOC and overall organisational performance. Regarding these thirty studies, the effect sizes ranged from 0.08 to 0.79 while the sample size varied from 89 to 1579, and the total sample size of these thirty studies was 9,515. Fourteen studies were from large power distance societies while fifteen studies were from small power distance societies [1]. Thirteen studies came from individualistic regions and sixteen studies from more collective regions [1]. Eighteen studies were from male-dominated societies while eleven studies were from female-dominated societies [1]. Thirteen studies were conducted in strong uncertainty avoidance regions and sixteen studies in relatively weak uncertainty avoidance regions [1]. Nineteen studies were from long-term oriented areas whilst nine studies from short-term oriented areas [1,2]. Eighteen studies were from restrained regions and ten studies from indulgence-oriented regions [1,2]. Twenty-three studies were administered in developing regions and only seven studies in developed regions. Eight studies were from the manufacturing industry and nine studies from multiple industries, plus six studies from the service industries [3].

Table 5-1: Descriptive statistics of studies (the KFOC-overall organisational performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Baker and Sinkula, 1999-OP	0.325	411	US	S	I	M	W	S	I	Developed	Multiple
2	Boumarafi and Jabnoun, 2008-OP [2]	0.282	89	UAE	L	C	M	S	NA	NA	Developing	Multiple
3	Chen *et al*, 2011-OP	0.649	556	China	L	C	M	W	L	R	Developing	Service
4	Chen *et al*., 2009-OP [3]	0.314	325	China	L	C	M	W	L	R	Developing	Unclear
5	Cheng *et al*., 2008-OP	0.354	218	China	L	C	M	W	L	R	Developed	Multiple
6	Chuang *et al.,* 2013-OP	0.274	119	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
7	Forte *et al*., 2016-OP [3]	0.500	101	Iran	S	I	F	W	S	R	Developing	Unclear
8	Guimarães *et al*., 2016-OP	0.080	618	Brazil	L	C	M	S	L	I	Developing	Manufacturing
9	Huang *et al*., 2010-OP	0.440	170	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
10	Imran *et al*., 2018-OP	0.710	197	Pakistan	S	C	M	S	L	R	Developing	Service
11	Jain and Moreno, 2015-OP	0.590	205	India	L	I	M	W	L	R	Developing	Manufacturing
12	Kamath *et al*., 2016-OP	0.790	249	India	L	I	M	W	L	R	Developing	Manufacturing
13	Kamhawi, 2012-OP [1]	0.370	167	Bahrain	NA	NA	NA	NA	NA	NA	Developing	Multiple
14	Khan *et al*., 2015-OP	0.737	214	Pakistan	S	C	M	S	L	R	Developing	Service
15	Lin *et al*., 2013-OP	0.290	214	Taiwan (China)	S	C	F	S	L	I	Developing	Multiple
16	Mageswari *et al*., 2017-OP	0.652	251	India	L	I	M	W	L	R	Developing	Manufacturing
17	Matin and Sabagh, 2015-OP [3]	0.530	148	Iran	S	I	F	W	S	R	Developing	Unclear
18	Migdadi *et al*., 2016-OP [3]	0.484	258	Saudi	L	C	M	S	S	I	Developing	Unclear
19	Migdadi, 2009-OP [3]	0.136	416	Saudi Arabia	L	C	M	S	S	I	Developing	Unclear
20	Mousavizadeh *et al*., 2015-OP	0.560	268	US	S	I	M	W	S	I	Developed	Multiple
21	Palacios-Marqués *et al*., 2011-OP	0.440	193	Spain	S	I	F	S	L	R	Developed	Service
22	Payal *et al*. 2016-OP	0.423	100	India	L	I	M	W	L	R	Developing	Service
23	Pham and Nguyen, 2017-OP [3]	0.316	103	Vietnam	L	C	F	W	L	R	Developing	Unclear
24	Rezaei *et al*., 2017-OP	0.371	222	Iran	S	I	F	W	S	R	Developing	Manufacturing

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
25	Ruiz-Mercader *et al*., 2006-OP	0.307	151	Spain	S	I	F	S	L	R	Developed	Service
26	Samson *et al*., 2017-OP	0.425	1579	Australia	S	I	M	W	S	I	Developed	Multiple
27	Song and Kolb, 2013-OP	0.492	633	Korea	S	C	F	S	L	R	Developing	Multiple
28	Valdez-Juárez *et al*., 2016-OP	0.144	903	Spain	S	I	F	S	L	R	Developed	Multiple
29	Wei, 2010-OP [3]	0.350	204	China	L	C	M	W	L	R	Developing	Unclear
30	Wong and Wong, 2011-OP	0.215	233	Malaysia	L	C	M	W	S	I	Developing	Manufacturing

Note: [1] National culture scores of Bahrain are unavailable while the study of Kamhawi (2012) collected data in Bahrain, so it was excluded when moderating effects of national culture were tested. [2] Boumarafi and Jabnoun (2008) collected data in the UAE but the scores of long-term oriented and indulgence of the UAE are not available. This study was also dropped when moderating effects of long-term orientation and indulgence were analysed. [3] The study of Chen *et al*. (2009), Forte et al. (2016), Matin and Sabagh (2015), Migdadi *et al*. (2016), Migdadi (2009), Pham and Nguyen (2017), and Wei, 2010 did not report industries in detail; therefore, these studies were excluded when moderating effect of industries was tested.

5.1.1.2 Main effect analysis

The random-effects model was used to analyse the relationship between the KFOC and organisational performance because the effect sizes and sampling frameworks varied (Borenstein *et al.*, 2010). Calculated by using CMA 3.0, a positive comprehensive correlation coefficient was indicated between the KFOC and the overall organisational performance (r= 0.438, 95% confidence interval (CI): 0.362, 0.508, Z-value= 10.211, $p < 0.001$), which supported $H1_1$. Figure 5-1 shows a forest plot of the empirical results (The first column in the forest plot shows the studies involved in the meta-analysis and the second column shows the correlation coefficient between KFOC and overall organisational performance. The third and the fourth columns are the lower limit and upper limit confidence intervals, respectively. The significance test data appears in the fifth (Z-value) and six (p-value) columns. The size of the black box denotes the weight of the effect size (correlation co-efficient) and was used to calculate the overall effect size while the line through the black box denotes the interval confidence. The last line of the forest plot shows the overall effect size: r= 0.438, lower limit CI: 0.362, upper limit CI: 0.508 (95%) for the overall effect size, the significance of the test: Z-value= 10.211, $p < 0.001$, indicating the test is significant. The location of the diamond reflects the strength of the overall effect size while the width of the diamond reflects the CI of the overall effect size).

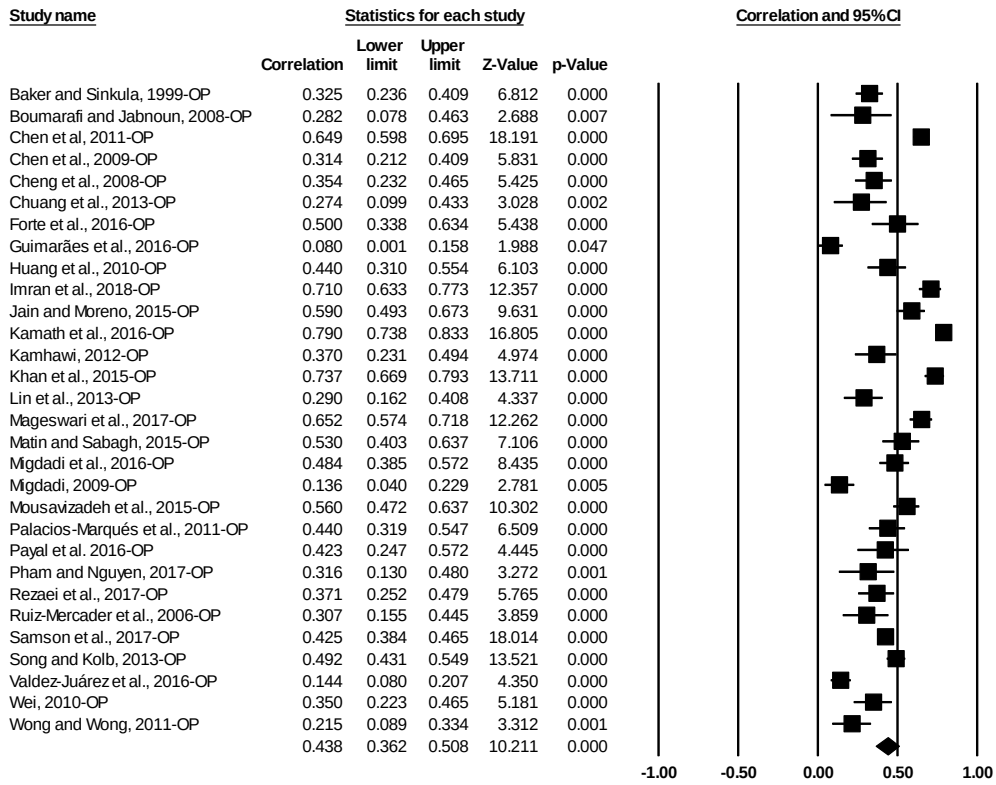


Figure 5-1: Forest plot of KFOC-overall organisational performance relationship

5.1.1.3 Publication bias analysis

There might be a publication bias arising from those unpublished papers that might report insignificant relationships. The classic fail-safe N test (Rosenthal, 1979) also showed 3,318 (N_1) studies with zero effect which were more than 160 ($5k_1+10= 160$, $k_1= 30$) (Rosenthal, 1979, 1991) that were needed to make the test invalid. In addition, $N_1/(5k_1+10)= 20.738$ was larger than 1 which implies that the number of the studies was sufficient enough for the meta-analysis (Becker, 2005; Mullen *et al.*, 2001). Therefore, the test results showed there was no publication bias.

5.1.1.4 Homogeneity test

It is also necessary to examine the homogeneity of the selected studies when conducting a meta-analysis with the random model. The homogeneity analysis calculates the probability of the variance reflected by the effect sizes that would be observed if only

the sampling error was making them different (Cooper, 2017). The homogeneity statistic revealed that this study was heterogeneous (Q-statistic= 546.419, $p < 0.001$, $I^2 = 94.693$) because I^2 was larger than 75. It also suggested 94.693% of the total variance in the effect sizes was due to variance between studies, while $\tau^2 = 0.059$ meant 5.9% variance between studies was used to calculate the weights. Therefore, 94.693% of the total variance in effect sizes could not be explained by the sampling error only, which needs further exploration about the potential moderators and the cause of the heterogeneity.

Table 5-2: Homogeneity test of the KFOC-overall organisational performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
30	546.419	29	0.000	94.693	0.059	0.021	0.000	0.242

5.1.1.5 Moderating effect analysis

Most of the national culture dimensions did not affect the KFOC-overall organisational performance relationship. As set out in Table 5-3, H_{PDa1}, H_{ICa1}, H_{FMa1}, H_{UAa1}, and H_{LSa1} were not supported because none of the $Q_{between}$ values of the groups of small and large power distance, collectivism and individualism, femininity and masculinity, weak and high uncertainty avoidance, long-term and short-term orientation was statistically significant, however, the restrained and indulgence-oriented culture differentiated with each other regarding the impacts on the KFOC-overall organisational performance relationship was due to the significant $Q_{between}$ value. ($Q_{between}$: 5.590; df(Q):1; p-value: 0.018*<0.1), but the overall effect size of the indulgence-oriented culture was smaller than the restrained culture ($r_{indulgence}$= 0.330*** <$r_{restrained}$= 0.504***), which rejected H_{IRa1}.

Table 5-3: Categorical moderator test of national culture (the KFOC-overall organisational performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	14	0.428	0.283	0.554	5.400	0.000	Not supported H_{PDa1} [1]
Power distance (S)	15	0.451	0.361	0.532	8.818	0.000	
Total between	$Q_{between}$: 0.077; df(Q):1; p-value: 0.781						
Collectivism (C)	16	0.404	0.285	0.510	6.235	0.000	Not supported H_{ICa1}[1]
Individualism (I)	13	0.483	0.373	0.580	7.619	0.000	
Total between	$Q_{between}$: 1.025; df(Q):1; p-value: 0.311						
Femininity (F)	11	0.376	0.279	0.466	7.090	0.000	Not supported H_{FMa1}[1]
Masculinity (M)	18	0.476	0.370	0.569	7.860	0.000	
Total between	$Q_{between}$: 1.989; df(Q):1; p-value: 0.158						
Uncertainty avoidance (S)	13	0.392	0.258	0.510	5.431	0.000	Not supported H_{LSa1} [1]
Uncertainty avoidance (W)	16	0.479	0.391	0.557	9.489	0.000	
Total between	$Q_{between}$: 1.310; df(Q):1; p-value: 0.252						
Long-term orientation (L)	19	0.466	0.351	0.566	7.195	0.000	Not supported H_{IRa1}[1,2]
Short-term orientation (S)	9	0.397	0.305	0.482	7.839	0.000	
Total between	$Q_{between}$: 0.914; df(Q):1; p-value: 0.339						
Indulgence (I)	10	0.330	0.223	0.429	5.772	0.000	Rejected H_{IRa1}[1,2]
Restrained (R)	18	0.504	0.399	0.596	8.246	0.000	
Total between	$Q_{between}$: 5.590; df(Q):1; p-value: 0.018*<0.1						

Note: [1] Kamhawi (2012) was dropped; [2] Boumarafi and Jabnoun (2008) was dropped.

Distinctions were not significant by the categorical moderating test of economies and industry[7], which did not support H_{Ea1} and H_{Ia1}. Detailed results can be found in Appendix V.

5.1.2 KFOC and financial performance

5.1.2.1 Descriptive statistic

As set out in Table 5-4, fourteen effect sizes of thirteen studies focused on the KFOC-financial performance relationships. Among these fourteen effect sizes, the minimum effect size was 0.016 while the maximum effect size was 0.79. The sample sizes varied from 61 to 510 and the overall sample size was 2,851. Three studies were implemented in large power distance societies and nine studies in small power distance societies [1].

[7] The studies did not report industries or collected data from multiple industries were excluded for moderating test for the type of industries. Such exclusion was conducted for all the moderating tests for the type of industries.

Eight studies were from collective regions and four from individualistic regions [1]. Nine studies could be found from feminine societies and three from masculine societies [1]. Eight studies were from strong uncertainty avoidance regions and four from weak uncertainty avoidance regions. Surveys were carried out in eight long-term oriented societies and in three short-term oriented societies, respectively [1,2]. Eight studies were conducted in indulgence-oriented regions and three in restraint regions [1,2]. Eight studies were in the group of developing regions and four in the group of developed regions [1]. Six studies collected data from the manufacturing industry and two from the service industries, while five were from multiple industries [2].

Table 5-4: Descriptive statistics of studies (the KFOC-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Akgün *et al*., 2014-F	0.110	193	Turkey	L	C	F	S	L	I	Developing	Manufacturing
2	Chen and Liang, 2011-F	0.490	97	Taiwan (China)	S	C	F	S	L	I	Developing	Multiple
3	Chen *et al*., 2008-F	0.390	150	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
4	Collins and Smith, 2006-F	0.313	136	US	S	I	M	W	S	I	Developed	Multiple
5	Feng *et al*., 2014-F	0.611	214	China	L	C	M	W	L	R	Developing	Manufacturing
6	Hsu and Sabherwal, 2012-F	0.050	510	Taiwan (China)	S	C	F	S	L	I	Developing	Multiple
7	Kianto and Andreeva, 2014-F-M [1]	0.535	86	NA	NA	NA	NA	NA	NA	NA	NA	Manufacturing
8	Kianto and Andreeva, 2014-F-S [1]	0.511	61	NA	NA	NA	NA	NA	NA	NA	NA	Service
9	Kianto *et al*., 2013-F	0.152	399	Finland	S	I	F	W	S	I	Developed	Multiple
10	Lee and Choi, 2010-F	0.016	187	Korea	S	C	F	S	L	R	Developing	Multiple
11	Marouf, 2016-F [2]	0.790	392	Kuwait	L	C	F	S	NA	NA	Developing	Unclear
12	Pett and Wolff, 2016-F	0.171	117	US	S	I	M	W	S	I	Developed	Manufacturing
13	Santos-Vijande *et al*., 2013-F	0.620	154	Spain	S	I	F	S	L	R	Developed	Service
14	Shih et al., 2009-F	0.089	155	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing

Note: [1] Kianto and Andreeva (2014) gathered their research data from Finland, China and Russia, but these three countries are not consistent in any dimension of the national culture and economic status. Therefore, it was deleted when analysis the moderating effects of national culture and economy. [2] Marouf (2016)' study was carried out in Kuwait where a score of the long-term and a score of indulgence is not available. Then, it was abandoned when we analyse the moderating effects of long-term orientation and indulgence. In addition, Marouf (2016) did not clearly report categories of industries in which the data was collected; thus, it was dropped when the moderating effect of industries was analysed.

5.1.2.2 Main effect analysis

Figure 5-2 shows that the weighted average correlation between KFOC and financial performance was 0.375 (95% CI: 0.190, 0.533, Z-value= 3.840, $p < 0.001$), which indicated a significant main effect between KFOC and financial performance and supported $H1_2$.

Study name	Correlation	Lower limit	Upper limit	Z-Value	p-Value
Akgün et al., 2014-F	0.110	-0.032	0.247	1.522	0.128
Chen and Liang, 2011-F	0.490	0.322	0.628	5.197	0.000
Chen et al., 2008-F	0.390	0.245	0.518	4.993	0.000
Collins and Smith, 2006-F	0.313	0.153	0.457	3.735	0.000
Feng et al., 2014-F	0.611	0.519	0.689	10.321	0.000
Hsu and Sabherwal, 2012-F	0.050	-0.037	0.136	1.127	0.260
Kianto and Andreeva, 2014-F-M	0.535	0.364	0.671	5.440	0.000
Kianto and Andreeva, 2014-F-S	0.511	0.297	0.676	4.296	0.000
Kianto et al., 2013-F	0.152	0.055	0.246	3.048	0.002
Lee and Choi, 2010-F	0.016	-0.128	0.159	0.217	0.828
Marouf, 2016-F	0.790	0.750	0.825	21.132	0.000
Pett and Wolff, 2016-F	0.171	-0.011	0.342	1.844	0.065
Santos-Vijande et al., 2013-F	0.620	0.512	0.709	8.909	0.000
Shih et al., 2009-F	0.089	-0.070	0.243	1.100	0.271
	0.375	0.190	0.533	3.840	0.000

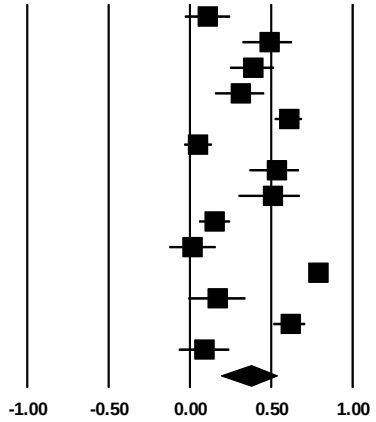


Figure 5-2: Forest plot of KFOC-financial performance relationship

5.1.2.3 Publication bias analysis

1,369 (N_2) studies with insignificant correlations between KFOC and financial performance that are more than 80 ($5k_2+10= 80$, $k_2= 14$) (Rosenthal, 1979, 1991) were included in the sample and would change the conclusion by the classic fail-safe N (Rosenthal, 1979) test. Furthermore, $N_2/(5k_2+10)= 17.113$ was larger than 1 which indicates that the number of the studies are satisfactory for the meta-analysis (Becker, 2005; Mullen *et al*., 2001) in this study. Therefore, the analysis showed that there was no publication bias.

5.1.2.4 Homogeneity test

I^2 (I^2= 96.460) was larger than 75 and indicated this study was heterogeneous, based on homogeneity test (Q-statistic= 367.186, p < 0.000, I^2= 96.460). In addition, I^2 implied 96.460% of the total variance in the effect sizes was due to variance between studies, while τ^2= 0.066 indicated 6.6% variance between studies was applied to calculate the weights. Thus, the variation in effect sizes cannot be explained by the sampling error only, which is necessary to explore the effects of moderators and the roots of the heterogeneity.

Table 5-5: Homogeneity test of the KFOC-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
14	367.186	13	0.000	96.460	0.066	0.058	0.004	0.375

5.1.2.5 Moderating effect analysis

Only industry was a categorical moderator strengthening the KFOC-financial performance relationship in service industries ($r_{service}$= 0.590***> $r_{manufacturing}$= 0.334**), which supported H_{Ia2}. In contrast, national culture and economy did not affect the relationship between the KFOC-financial performance relationship. Detailed results can be found in Appendix V.

Table 5-6: Categorical moderator test of industries (the KFOC-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	6	0.334	0.122	0.517	3.024	0.002	Supported H_{Ia2}
Service	2	0.590	0.488	0.676	9.233	0.000	
Total between	$Q_{between}$: 5.861; df(Q):1; p-value: 0.015*<0.05						[2]

Note: [2] The study of Marouf (2016) was excluded.

5.1.3 KFOC and non-financial performance

5.1.3.1 Descriptive statistic

In Table 5-7, descriptive statistics of twenty-three studies with twenty-four effect sizes which explored the relations between KFOC and non-financial performance are displayed. Among these twenty-three studies, the effect sizes ranged from 0.104 to 0.728 while the sample sizes fluctuated from 81 to 448 and the total sample size was 4,190. Sixteen studies were carried out in small power distance societies and six in large power distance societies [1]. Data were collected in ten individualistic regions and twelve collective regions [1]. Twelve studies were from feminine regions while ten from masculine regions [1]. Thirteen studies were from strong uncertainty avoidance regions and nine studies from weak uncertainty avoidance regions [1]. Surveys were deployed in thirteen long-term oriented regions and seven short-term oriented regions [1,2]. Ten studies were in the indulgence-oriented culture group and ten in the restrained culture group [1,2]. Fifteen studies were from developing economies and seven studies were from developed economies [1]. Nine studies gathered data from multiple industries, plus seven from the manufacturing industry and six from the service industries [3].

Table 5-7: Descriptive statistics (the KFOC-non-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Boumarafi and Jabnoun, 2008-NF [2]	0.289	89	UAE	L	C	M	S	NA	NA	Developing	Multiple
2	Chen and Liang, 2011-NF	0.532	97	Taiwan (China)	S	C	F	S	L	I	Developing	Multiple
3	Chong *et al*., 2011-NF [3]	0.128	203	Malaysia	L	C	M	W	S	I	Developing	Government
4	Chuang *et al*., 2013-NF	0.293	119	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
5	Cooper *et al*., 2016-NF	0.551	448	US	S	I	M	W	S	I	Developed	Service
6	Giampaoli and Ciambotti, 2016-NF	0.529	85	Italy	S	I	M	S	L	R	Developed	Multiple
7	Huang *et al*., 2010-NF	0.436	170	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
8	Jiménez-Jiménez *et al*., 2014-NF	0.104	81	Spain	S	I	F	S	L	R	Developed	Service
9	Kianto and Andreeva, 2014-NF-M [1]	0.435	175	NA	NA	NA	NA	NA	NA	NA	NA	Manufacturing
10	Kianto and Andreeva, 2014-NF-S [1]	0.391	120	NA	NA	NA	NA	NA	NA	NA	NA	Service
11	Kim and Hancer, 2010-NF	0.149	179	US	S	I	M	W	S	I	Developed	Service
12	Lee, *et al*., 2012-NF	0.536	105	Korea	S	C	F	S	L	R	Developing	Multiple
13	Machuca and Costa, 2012-NF	0.208	100	Spain	S	I	F	S	L	R	Developed	Service
14	Mageswari *et al*., 2017-NF	0.543	251	India	L	I	M	W	L	R	Developing	Manufacturing
15	Migdadi *et al*., 2016-NF [3]	0.430	258	Saudi	L	C	M	S	S	I	Developing	Unclear
16	Mills and Smith, 2011-NF [2]	0.723	189	Jamaica	S	I	M	W	NA	NA	Developing	Multiple
17	Moon and Lee, 2014-NF	0.690	230	Korea	S	C	F	S	L	R	Developing	Multiple
18	Noh *et al*., 2014-NF	0.536	108	Korea	S	C	F	S	L	R	Developing	Multiple
19	Rezaei *et al*., 2017-NF	0.414	222	Iran	S	I	F	W	S	R	Developing	Manufacturing
20	Santos-Vijande *et al*., 2013-NF	0.370	154	Spain	S	I	F	S	L	R	Developed	Service
21	Shih *et al*., 2009-NF	0.298	155	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
22	Sucahyo *et al*., 2016-NF	0.387	139	Indonesia	L	C	F	W	L	R	Developing	Multiple
23	Tan and Wong, 2015-NF	0.728	206	Malaysia	L	C	M	W	S	I	Developing	Manufacturing
24	Zhang *et al*., 2007-NF	0.457	307	Canada	S	I	M	W	S	I	Developed	Multiple

Note: [1] Kianto and Andreeva (2014) collected their research data from Finland, China and Russia, but these three countries are not consistent in any dimension of the national culture and economic status. Therefore, it was not included when the moderating effects of national culture and economy were examined. [2] The study of Boumarafi and Jabnoun (2008) as well Mills and Smith (2011) were accomplished with the data from the UAE and Jamaica. The score of the long-term and the score of indulgence are not available in these countries. Thus, these two studies were removed when the moderating effects of the long-term orientation and indulgence were analysed. [3] The subjects of Chong *et al*. (2011)'s study was from government; while Migdadi *et al*. (2016) did not clearly specify which industry they collated data; thus, these studies were omitted when the moderating effect of industries was analysed.

5.1.3.2 Main effect analysis

A positive integrative effect size, which was 0.443 (95% CI: 0.367, 0.513, Z-value= 10.275, $p < 0.001$), indicated that KFOC was significantly associated with the non-financial performance of firms, which supported $H1_3$. The detailed analysis is shown in Figure 5-3.

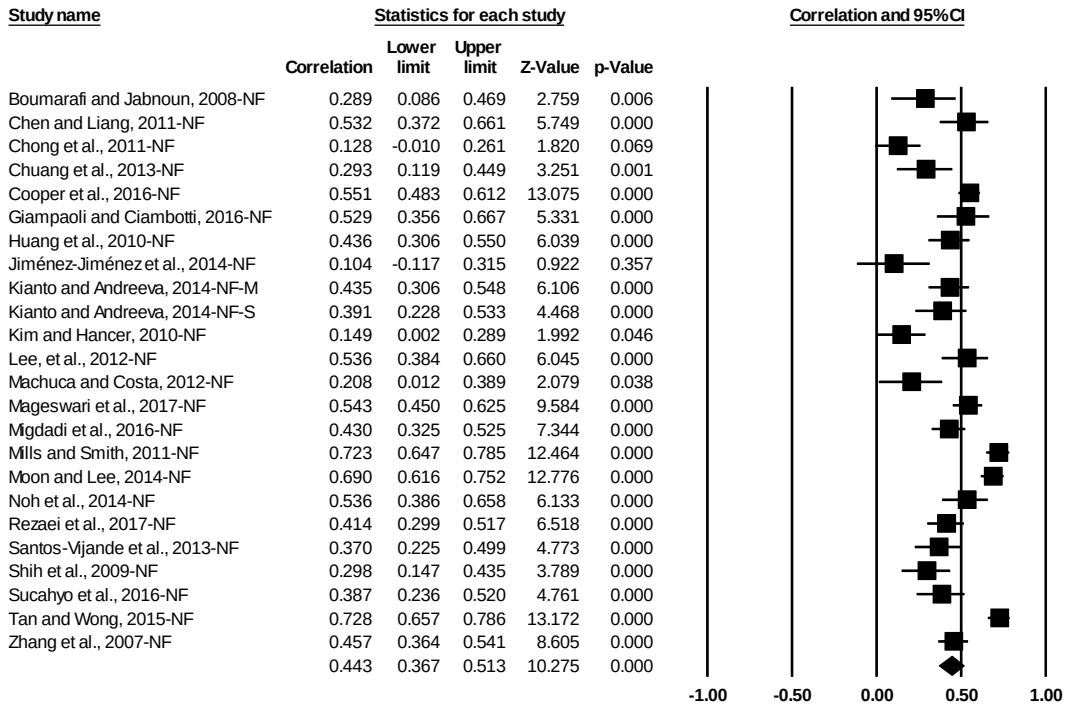


Figure 5-3: Forest plot of the KFOC-non-financial performance relationship

5.1.3.3 Publication bias analysis

The classic fail-safe N test (Rosenthal, 1979) indicated that 5,799 (N3) studies with zero effect size were more than the 130 ($5k_3+10= 130$, $k_3= 24$) (Rosenthal, 1979, 1991) needed to reverse the current analysis result. Additionally, $N_3/(5k_3+10)= 44.608$ was larger than 1 which suggested that the number of the studies was appropriate for meta-analysis (Becker, 2005; Mullen *et al*., 2001). Therefore, published bias was not detected in this study.

5.1.3.4 Homogeneity test

This study was also heterogenous from the results of homogeneity statistic (Q-statistic= 197.260, p < 0.000, I^2= 88.340) because I^2 was larger than 75 (Huedo-Medina *et al*., 2006; Noel and Todd, 2012). I^2 indicated 88.34% of the total variance in the effect sizes was due to variance between studies, while τ^2= 0.045 meant 4.5% variance between studies was used to calculate the weights. Therefore, merely considering the sampling error could not interpret the overall variation in effect sizes, and it is necessary to examine the effects of potential moderators and the reasons for the heterogeneity.

Table 5-8: Homogeneity test of the KFOC-non-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
24	197.260	23	0.000	88.340	0.045	0.016	0.000	0.211

5.1.3.5 Moderating effect analysis

The empirical results showed that none of the contextual factors (national culture, economy, and industry) had an impact on the KFOC-non-financial performance relationship. Detailed statistics can be found in Appendix V.

5.1.4 Summary of KFOC-organisational performance relationship meta-analysis

The meta-analysis result indicated a positive comprehensive relationship between KFOC and the overall organisational performance, which supported $H1_1$ (r= 0.438, 95% confidence interval (CI): 0.362, 0.508, Z-value= 10.211, p < 0.001). In addition, the KFOC positively impacted on the financial performance (r= 0.375, 95% CI: 0. 0.190, 0.533, Z-value= 3.840, p < 0.001) and the non-financial performance (r= 0.443, 95% CI: 0.367, 0.513, Z-value= 10.275, p < 0.001), respectively, which supported $H1_2$ and $H1_3$. In addition, different degrees of indulgence moderated KFOC-overall organisational performance relationship according to significant $Q_{between}$ value

($r_{indulgence}$= 0.330*** <$r_{restrained}$= 0.504***; $Q_{between}$: 5.590; df(Q):1; p-value: 0.018*<0.1), so H_{IRa1} was rejected. However, differences in other dimensions of national culture did not have an impact on KFOC-organisational performance relationship due to insignificant $Q_{between}$ values, which did not support the proposed assumptions. Likewise, different economies did not significantly impact on the KFOC-organisational performance relationships, which did not support H_{Ea1}, H_{Ea2}, and H_{Ea3}; however, surprisingly, the overall effect sizes were larger in developing economies than in developed economies for all three KFOC-organisational performance relationships. On the other hand, the comprehensive effect size in the service industries was larger than in the manufacturing industry for both the KFOC-overall organisational performance relationship and the KFOC-financial performance relationship, but the differences between service and manufacturing industries were significant for the KFOC-financial performance relationship, which supported H_{Ia2} ($r_{service}$= 0.590***> $r_{manufacturing}$= 0.334**; $Q_{between}$: 5.861; df(Q):1; p-value: 0.015*<0.05) but did not support H_{Ia1}. Contrary to expectations, the overall effect size of the KFOC-non-financial performance relationship was larger in the manufacturing industry than in the service industries, but the distinction was not significant, which did not support H_{Ia3}. The significant results obtained from the main effects and moderating effects regarding KFOC and organisational performance are summarised in Figure 5-4. A meta-analysis of knowledge-based leadership and organisational performance relationships is given in the next section (Section 5.2).

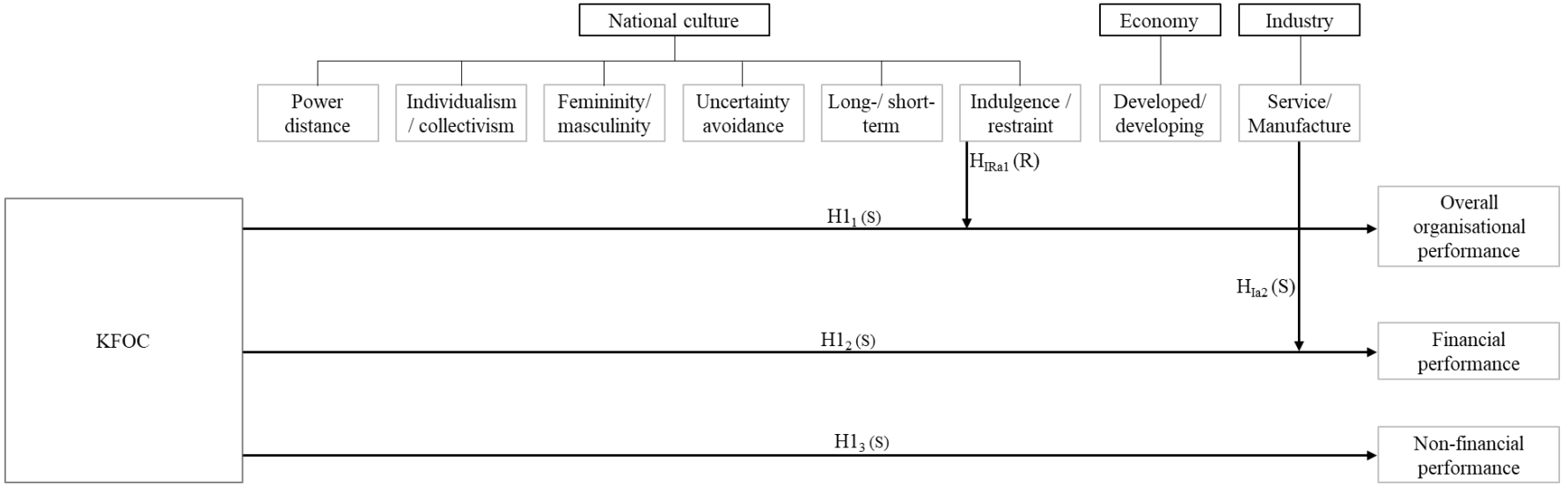


Figure 5-4: Empirical results of KFOC-organisational performance relationships

5.2 Knowledge-based leadership and organisational performance

Twenty-two studies with twenty-five effect sizes were used to evaluate the relationships between knowledge-based leadership and organisational performance. Among them, ten studies examined the relationship between knowledge-based leadership and overall organisational performance; five studies paid attention to the knowledge-based leadership-financial performance relationship; while ten studies explored the links between knowledge-based leadership and non-financial performance of organisations. Empirical results of the meta-analysis on the relationships between knowledge-based leadership and organisational performance are presented in this section.

5.2.1 Knowledge-based leadership and overall organisational performance

5.2.1.1 Descriptive statistics

Detailed statistics of ten studies which explored the relationship between knowledge-based leadership and overall organisational performance are set out in Table 5-9. The effect sizes varied from 0.280 to 0.754 while the sample sizes ranged from 89 to 1,597 and the total sample size was 3,262. Four studies were from large power distance societies and five from small power distance societies [1]. Four studies collected data from collective regions and five from individualistic regions [1]. Six studies were carried out in masculine societies and three in more feminine societies [1]. Two were from strong uncertainty avoidance regions while seven from weak uncertainty regions [1]. Three studies were included in the group of long-term orientation and five in short-term orientation group [1,2]. Four studies could be found in indulgence-oriented cultures and four in restrained cultures [1,2]. Eight studies were implemented in developing economies plus another two in developed economies. Four studies obtained data from

the manufacturing industry and one from the service industry; while there were five from multiple industries.

Table 5-9: Descriptive statistics (the knowledge-based leadership-overall organisational performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economies	Industry
1	Boumarafi and Jabnoun, 2008-OP [2]	0.299	89	UAE	L	C	M	S	NA	NA	Developing	Multiple
2	Hsu, 2008-OP	0.460	256	Taiwan (China)	S	C	F	S	L	I	Developing	Multiple
3	Jain and Moreno, 2015-OP	0.450	205	Indian	L	I	M	W	L	R	Developing	Manufacturing
4	Kamhawi, 2012-OP [1]	0.340	167	Bahraini	NA	NA	NA	NA	NA	NA	Developing	Multiple
5	Mageswari *et al*., 2017-OP	0.559	251	Malaysia	L	C	M	W	S	I	Developing	Manufacturing
6	Mousavizadeh *et al*., 2015-OP	0.280	268	US	S	I	M	W	S	I	Developed	Multiple
7	Noruzy *et al*., 2013-OP	0.530	106	Iran	S	I	F	W	S	R	Developing	Manufacturing
8	Pee et al., 2010-OP	0.410	101	Singapore	L	C	M	W	L	R	Developing	Service
9	Rezaei *et al*., 2017-OP	0.410	222	Iran	S	I	F	W	S	R	Developing	Manufacturing
10	Samson *et al*., 2017-OP	0.410	1597	Australia	S	I	M	W	S	I	Developed	Multiple

Note: [1] Kamhawi (2012) collected data in Bahrain where Hofstede national culture scores are not available; therefore, this study was excluded when the categorical moderating test of the industry was analysed. The study of Boumarafi and Jabnoun (2008) was dropped when analysing the moderating effects of long-term orientation and indulgence-centred culture because scores of UAE in these two national culture dimensions are not available.

5.2.1.2 Main effect analysis

Positive integrated effect size was 0.420, obtained across ten studies, suggesting that knowledge-based leadership was significantly related to overall organisational performance (95% CI: 0.367, 0.470, Z-value= 13.946, $p < 0.001$), which supported $H2_1$.

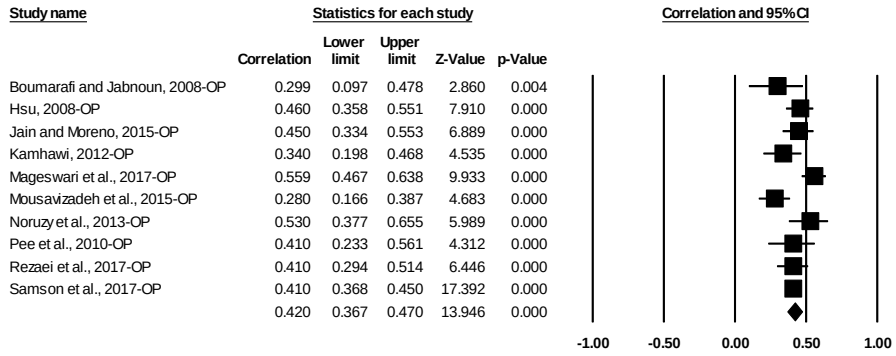


Figure 5-5: Forest plot of the knowledge-based leadership-overall organisational performance relationship

5.2.1.3 Publication bias analysis

The classic fail-safe N test (Rosenthal, 1979) suggested that the 1,301 (N_1) studies with zero effect size were more than 60 ($5k_1+10= 60$, $k_1= 10$) (Rosenthal, 1979, 1991) needed to change the integrated positive relationship between knowledge-based leadership and overall organisational performance. In addition, $N_1/(5k_1+10)= 21.683$ was larger than 1 which also confirmed that the number of the studies was sufficient for the meta-analysis (Becker, 2005; Mullen *et al.*, 2001). Thus, the selected publications could be considered as unbiased.

5.2.1.4 Homogeneity test

The heterogeneity of this study was medium, based on results of homogeneity statistic (Q-statistic= 21.419, $p= 0.011 < 0.05$, $I^2= 57.981 >50$) (Huedo-Medina *et al.*, 2006; Noel and Todd, 2012). I^2 denoted that 57.981 % of the total variance in the effect sizes

was due to variance between studies, while τ^2= 0.005 showed 0.5% variance between studies was used to calculate weights. Hence, more than half the overall variation in effect sizes cannot be explained by sampling error only, and it is worth investigating the effects of potential moderators and the reasons for the heterogeneity.

Table 5-10: Homogeneity test of the knowledge-based leadership-overall organisational performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
10	21.419	9	0.000	57.981	0.005	0.005	0.000	0.073

5.2.1.5 Moderating effect analysis

National culture, economy, and industry did not have an impact on the relationship between knowledge-based leadership and overall organisational performance according to insignificant subgroup analysis. Detailed results can be found in Appendix V.

5.2.2 Knowledge-based leadership and financial performance

5.2.2.1 Descriptive statistics

Table 5-11 shows characteristics of the five studies which assessed the links between knowledge-based leadership and financial performance. Among them, the effect size varied from 0.016 to 0.564 while the sample size was from 117 to 408 and the total sample size was 1,166. Three studies were conducted in small power distance countries and two in large power distance countries. Three studies were from collective countries and two from individualistic countries. All five studies were administered in feminine-dominated countries. Respondents of three studies were from strong uncertainty avoidance nations and two studies were from weak uncertainty avoidance nations. Four studies collected data in long-term oriented cultures plus one in short-term-oriented countries. Two studies gathered information in restrained cultures and three in

restrained cultures Three studies were from developing countries while two from developed countries. Three studies conducted their survey in multiple industries. One study used data from the manufacturing industry and the other one tested data from the service industry.

Table 5-11: Descriptive statistics (the knowledge-based leadership-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Akgün *et al*., 2014-F	0.230	193	Turkey	L	C	F	S	L	I	Developing	Manufacturing
2	García-Morales *et al*., 2008-F	0.564	408	Spain	S	I	F	S	L	R	Developed	Multiple
3	Hartono *et al*., 2016-F	0.270	117	Indonesia	L	C	F	W	L	R	Developing	Service
4	Inkinen and Kianto, 2014-F	0.245	261	Finland	S	I	F	W	S	I	Developed	Multiple
5	Lee and Choi, 2010-F	0.016	187	Korea	S	C	F	S	L	R	Developing	Multiple

5.2.2.2 Main effect analysis

Empirical evidence (r= 0.279, 95% CI: 0.056, 0.475, Z-value= 2.439, p= 0.015 < 0.05) showed knowledge-based leadership was positively related to financial performance, which supported $H2_2$.

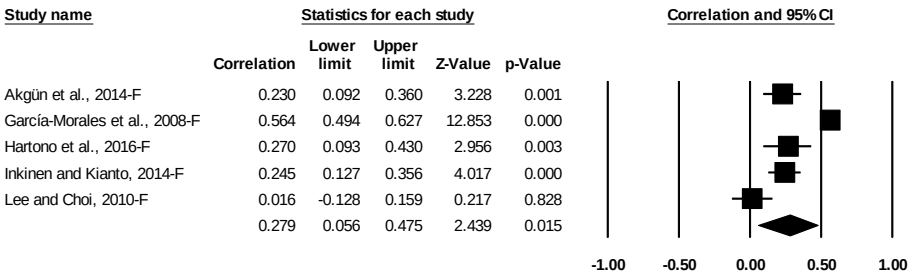


Figure 5-6: Forest plot of the knowledge-based leadership-financial performance relationship

5.2.2.3 Publication bias analysis

The classic fail-safe N statistic (Rosenthal, 1979) showed that there were 136 (N_2) insignificant studies which were more than 35 ($5k_2+10= 35$, $k_2= 5$) needed (Rosenthal, 1979, 1991) to reverse the empirical results. In addition, $N_2/(5k_2+10)= 3.886$ was larger than 1 which also implied that the number of the studies in this meta-analysis was sufficient (Becker, 2005; Mullen *et al*., 2001). Therefore, there was no publication bias in this study.

5.2.2.4 Homogeneity test

The homogeneity statistic (Q-statistic= 60.010, p < 0.000, I^2= 93.334 >75) implied that this study was heterogeneous. I^2 suggested that 91.854% of the total variance in the effect sizes was due to variance between studies, while τ^2= 0.064 indicated 0.064 % variance between studies was applied to calculate the weights. Therefore, the overall

variation in effect sizes cannot be interpreted merely by sampling error; it is worth examining the effects of potential moderators and the causes of the heterogeneity.

Table 5-12: Homogeneity test of knowledge-based leadership-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
5	60.010	4	0.000	93.334	0.064	0.051	0.003	0.252

5.2.2.5 Moderating effect analysis

Empirical evidence showed that national culture and economy did not affect the relationship between knowledge-based leadership and financial performance. H_{Idp2} could not be tested because there was only one study in each category of the manufacturing and service industries. The empirical result can be found in Appendix V.

5.2.3 Knowledge-based leadership and non-financial performance

5.2.3.1 Descriptive statistics

Table 5-13 presents descriptive statistics of ten studies that examined the relationship between knowledge-based leadership and non-financial performance. Among these ten studies, the minimum effect size was 0.081while the maximum effect size was 0.684. The sample sizes ranged from 81 to 376 and the total sample size was 1,933. Six studies were from small power distance societies and four from large power distance countries. Six studies collected data in collective societies plus four in individualistic countries. Each group of masculine and feminine societies was comprised of five studies. Six studies were carried out in weak uncertainty avoidance regions and four in strong uncertainty avoidance regions. Five studies were in groups of short-term orientation societies and four in long-term societies[1]. Likewise, five studies were from indulgence-

oriented areas while four from restrained culture areas [1]. Seven studies were from developing regions and three from developed regions. Concerning the groups of industries, three studies collected data from the manufacturing industry, three from the service industries and three studies from multiple industries [2].

Table 5-13: Descriptive statistics (the knowledge-based leadership-non-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economies	Industry
1	Boumarafi and Jabnoun, 2008-NF [1]	0.217	89	UAE	L	C	M	S	NA	NA	Developing	Multiple
2	Gowen Iii *et al.*, 2009-NF	0.260	376	US	S	I	M	W	S	I	Developed	Service
3	Jiménez-Jiménez *et al*., 2014-NF	0.270	81	Spain	S	I	F	S	L	R	Developed	Service
4	Kim and Hancer, 2010-NF	0.081	179	US	S	I	M	W	S	I	Developed	Service
5	Lee et al., 2012-NF	0.573	105	Korea	S	C	F	S	L	R	Developing	Multiple
6	Mageswari *et al*., 2017-NF	0.636	251	Malaysia	L	C	M	W	S	I	Developing	Manufacturing
7	Rezaei *et al*., 2017-NF	0.385	222	Iran	S	I	F	W	S	R	Developing	Manufacturing
8	Sucahyo *et al*. 2016-NF	0.524	139	Indonesia	L	C	F	W	L	R	Developing	Multiple
9	Tan and Wong, 2015-NF	0.684	206	Malaysia	L	C	M	W	S	I	Developing	Manufacturing
10	Tang and Lai, 2016-NF [2]	0.556	285	Taiwan (China)	S	C	F	S	L	I	Developing	Government

Note: [1] The study of Boumarafi and Jabnoun (2008) was excluded when examining moderating effects of indulgence and long-term orientation culture because the score of indulgence and long-term orientation is unknown of the UAE. [2] Tang and Lai (2016) collected data in a department of government; therefore, these two studies were excluded when moderating effects of industry were tested.

5.2.3.2 Main effect analysis

The relationship between knowledge-based leadership and non-financial performance was signficantly positive according to the meta-analysis (r= 0.441, 95% CI: 0.303, 0.561, Z-value= 5.784, p < 0.001), which supported $H2_3$.

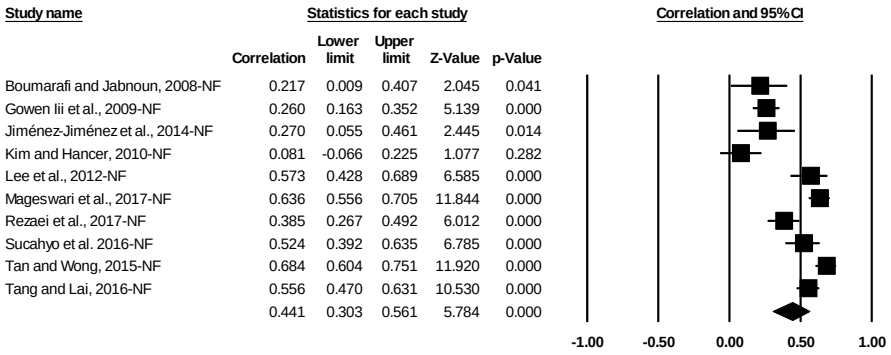


Figure 5-7: Forest plot of the knowledge-based leadership-non-financial performance relationship

5.2.3.3 Publication bias analysis

If 1,070 (N_3= 1070) studies with zero effect size were added in the current study, it could have reversed the present significant relationship by the classic fail-safe N test (Rosenthal, 1979); however, 1,070 were more than 60 ($5k_3$+10= 60, k_3= 10) (Rosenthal, 1979, 1991) and $N_3/(5k_3+10)$= 17.833 was larger than 1 which suggested that the number of the studies was appropriate for meta-analysis (Becker, 2005; Mullen *et al.*, 2001) test. Therefore, file-drawer problems did not occur in this study.

5.2.3.4 Homogeneity test

The homogeneity statistic showed that this study was heterogeneous (Q-statistic= 109.919, p < 0.000, I^2= 91.812) because I^2 was larger than 75. I^2 indicated that 91.812% of the total variance in the effect sizes was due to variance between studies, while τ^2= 0.060 suggested a 6% variance between studies was used to calculate the weights.

Therefore, 91.812% of the total variance in effect sizes could not be interpreted merely by the sampling error; so, it is necessary to evaluate the potential moderators and the cause of the heterogeneity.

Table 5-14: Homogeneity test of the knowledge-based leadership-non-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
10	109.919	9	0.000	91.812	0.060	0.034	0.001	0.246

5.2.3.5 Moderating effect analysis

It is apparent from Table 5-15 that different degrees of collectivism impacted on the relationship between knowledge-based leadership and non-financial performance of organisations according to categorical moderating analysis ($r_{individualism}$= 0.253*** < $r_{collectivism}$= 0.554***), but the distinctions were not obvious in other dimensions of national culture impacting on this relationship, which only supported H_{ICb3}. As shown in Table 5-28, economic differences had an effect on knowledge-based leadership-non-financial performance relationship due to significant $Q_{between}$ values, but the overall effect size was larger in developing countries than in developed countries ($r_{developing}$= 0.530*** > $r_{developed}$= 0.203**), hence H_{Eb3} is rejected. In addition, differences in industries impacted on the knowledge-based leadership-non-financial performance relationship due to the significant $Q_{between}$ values presented ($Q_{between}$: 9.957; df(Q):1; p-value: 0.002**<0.01), but the overall effect size was stronger in manufacturing industry than in service industries ($r_{manufancturing}$= 0.582***> $r_{service}$= 0.203**), hence H_{Ib3} is rejected as set out in Table 5-15.

Table 5-15: Categorical moderator test of national culture (the knowledge-based leadership-non-financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	4	0.544	0.365	0.684	5.249	0.000	Not supported H_{PDb3}
Power distance (S)	6	0.366	0.205	0.509	4.270	0.000	
Total between	$Q_{between}$: 2.353; df(Q):1; p-value: 0.125						

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Collectivism (C)	6	0.554	0.448	0.645	8.616	0.000	Supported H_{ICb3}
Individualism (I)	4	0.253	0.126	0.373	3.822	0.000	
Total between	$Q_{between}$: 13.563; df(Q):1; p-value: 0.000***<0.001						
Femininity (F)	5	0.475	0.370	0.569	7.888	0.000	Not supported H_{FMb3}
Masculinity (M)	5	0.409	0.137	0.623	2.868	0.004	
Total between	$Q_{between}$: 0.254; df(Q):1; p-value: 0.614						
Uncertainty avoidance (S)	4	0.426	0.233	0.586	4.108	0.000	Not supported H_{UAb3}
Uncertainty avoidance (W)	6	0.452	0.250	0.616	4.131	0.000	
Total between	$Q_{between}$: 0.039; df(Q):1; p-value: 0.843						
Long-term orientation (L)	4	0.501	0.388	0.599	7.621	0.000	Not supported H_{LSb3} [1]
Short-term orientation (S)	5	0.437	0.197	0.628	3.414	0.001	
Total between	$Q_{between}$: 0.279; df(Q):1; p-value: 0.597						
Indulgence (I)	5	0.472	0.239	0.654	3.739	0.000	Not supported H_{IRb3} [1]
Restrained (R)	4	0.448	0.320	0.560	6.279	0.000	
Total between	$Q_{between}$: 0.038; df(Q):1; p-value: 0.846						

Note: [1] The study of Boumarafi and Jabnoun (2008) was dropped.

Table 5-16: Categorical moderator test of economies (the knowledge-based leadership-non-financial performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	3	0.203	0.077	0.322	3.137	0.002	Rejected H_{Eb3}
Developing economies	7	0.530	0.421	0.624	8.209	0.000	
Total between	$Q_{between}$: 15.617; df(Q):1; p-value: 0.000***<0.001						

Table 5-17: Categorical moderator test of industries (the knowledge-based leadership-non-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	3	0.582	0.389	0.726	5.119	0.000	Rejected H_{Ib3} [2]
Service	3	0.203	0.077	0.322	3.137	0.002	
Total between	$Q_{between}$: 9.957; df(Q):1; p-value: 0.002**<0.01						

Note: [2] The study of Tang and Lai (2016) was dropped.

5.2.4 Summary of knowledge-based leadership-organisational performance relationship meta-analysis

As shown in Figure 5-8, it is apparent that knowledge-based leadership was positively associated with organisational performance ($H2_1$, overall organisational performance, r= 0.420, 95% CI: 0.367, 0.470, Z-value= 13.946, $p < 0.001$; $H2_2$, financial performance, r= 0.279, 95% CI: 0.056, 0.475, Z-value= 2.439, $p < 0.001$; $H2_3$, non-financial performance, r= 0.441, 95% CI: 0.303, 0.561, Z-value= 5.784, $p < 0.001$). The

significant $Q_{between}$ value ($Q_{between}$: 13.563; df(Q):1; p-value: 0.000***<0.01) revealed that only different degrees of individualism impacted on knowledge-based leadership-non-financial performance, which supported H_{ICb3}. Differences in other dimensions of national culture did not obviously affect knowledge-based leadership-organisational performance relationships. Surprisingly, the significance of the $Q_{between}$ value of different economies ($Q_{between}$: 15.617; df(Q):1; p-value: 0.000***<0.001) was found in the study of knowledge-based leadership-non-financial performance relationship, suggesting that economy affected the relationship between knowledge-based leadership and non-financial performance, but this relationship was strengthened in developing countries, which rejected H_{Eb3} ($r_{developing}$= 0.530*** > $r_{developed}$= 0.203**). Differences of industries influenced the relationship between knowledge-based leadership and non-financial performance, as the significant $Q_{between}$ values have proven ($Q_{between}$: 9.957; df(Q):1; p-value: 0.002**<0.01), but the overall effect size was larger in the manufacturing industry than in the service industries ($r_{manufancturing}$= 0.582***> $r_{service}$= 0.203**), which rejected H_{Ib3}. A summary of the empirical results on the knowledge-based leadership-organisational performance relationships is set out in Figure 5-8. The next section focuses on the meta-analysis of strategic KM and organisational performance.

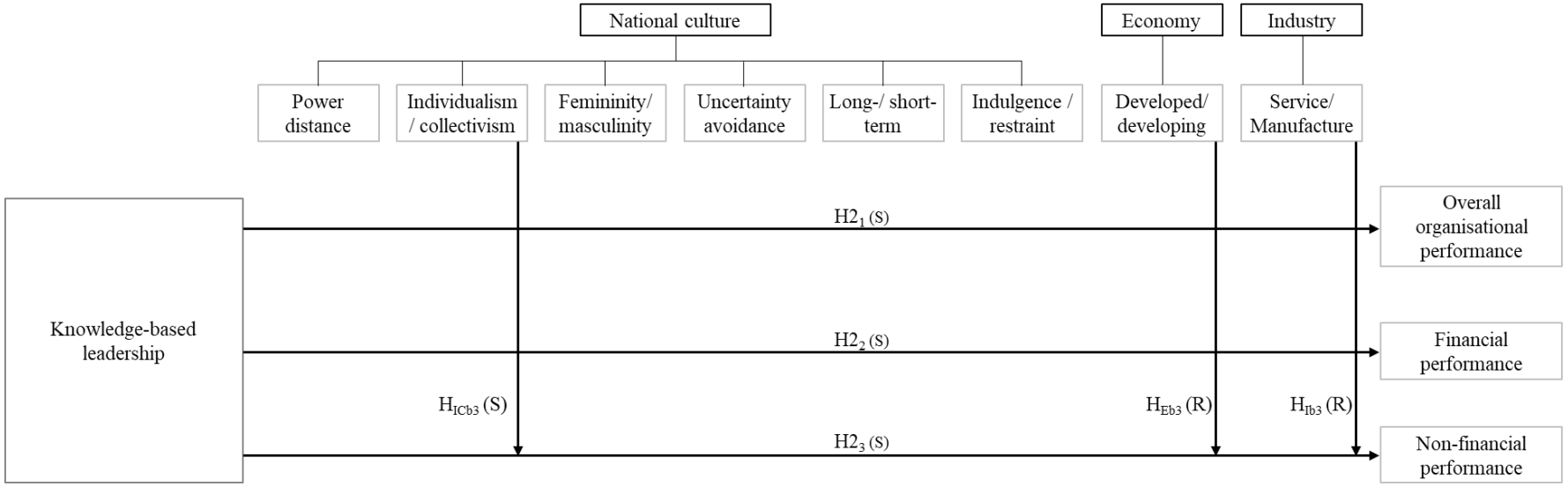


Figure 5-8: Empirical results of knowledge-based leadership-organisational performance relationships

5.3 Strategic KM and organisational performance

Seventeen effect sizes were identified from fourteen studies which examined the relations between strategic KM and organisational performance. Among them, three studies investigated the relationship between strategic KM and overall organisational performance while five effect sizes from four studies targeted strategic KM-non-financial performance relationship. In addition, eight studies with nine effect sizes explored the links between strategic KM and financial performance. Although the number of studies needed for meta-analysis is not stated in the literature, the numbers of effect sizes regarding strategic KM, overall organisational performance, and non-financial performance were quite small, so it is difficult to conduct categorical moderating analysis. As a result, this section mainly focuses on the meta-analysis of the relations between strategic KM and financial performance. (However, the main effects of the relationships between strategic KM and overall organisational performance as well as strategic KM and non-financial performance can be found in Appendix III-i and Appendix III-ii)

5.3.1 Descriptive statistics

Table 5-18 displays the characteristics of eight studies with nine effect sizes on the relationship between strategic KM and financial performance. The effect sizes varied from -0.017 to 0.535 while the sample sizes ranged from 61 to 399, and the total sample size was 1,422. Five studies were from small power distance countries and two from large power distance countries. Four studies were carried out in individualistic societies while three were in collective societies. One study obtained samples in a masculine nation while six were in feminine nations. Respondents were from four studies in weak uncertainty avoidance countries and three studies in strong uncertainty avoidance

countries. Four studies were in the group of long-term orientation cultures and three in the group of short-term orientation cultures. Similarly, four studies were administered in restrained culture countries while three in entertainment-centred culture countries. Four studies gathered data in developed countries plus two in developing countries and one study in a country with a transition economy. Three studies used data from the service industries and four studies from multiple industries, while only one was from the manufacturing industry.

Table 5-18: Descriptive statistics (strategic KM-financial performance relationships)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Cabrilo and Dahms, 2018-F	0.474	101	Serbia	L	C	F	S	L	R	Transition	Multiple
2	Claver-Cortés *et al*., 2018-F [2]	0.341	102	Spain	S	I	F	S	L	R	Developed	Unclear
3	Hartono *et al*., 2016-F	0.080	117	Indonesia	L	C	F	W	L	R	Developing	Service
4	Inkinen and Kianto, 2014-F	0.246	261	Finland	S	I	F	W	S	I	Developed	Multiple
5	Kianto and Andreeva, 2014-F-M [1]	0.535	86	Finland, China, Russia	NA	NA	NA	NA	NA	NA	NA	Manufacturing
6	Kianto and Andreeva, 2014-F-S [1]	0.454	61	Finland, China, Russia	NA	NA	NA	NA	NA	NA	NA	Service
7	Kianto *et al*., 2013-F	0.143	399	Finland	S	I	F	W	S	I	Developed	Multiple
8	Lee and Choi, 2010-F	-0.017	187	Korea	S	C	F	S	L	R	Developing	Multiple
9	Mandal and Bagchi, 2016-F	0.201	108	US	S	I	M	W	S	I	Developed	Service

Note: [1] Kianto and Andreeva (2014) conducted their surveys in Finland, China and Russia where national cultures and economies are inconsistent; therefore, this study was excluded when moderating effects of national culture and economy were tested. [2] Claver-Cortés *et al*. (2018) did not state industries in which they collated data; therefore, this study was excluded when testing the moderating effect of industry.

5.3.2 Main effect analysis

The meta-analysis results (r= 0.269, 95% CI: 0.149, 0.381, Z-value= 4.309, p < 0.001) showed that strategic KM was positively related to financial performance, which supported $H3_2$.

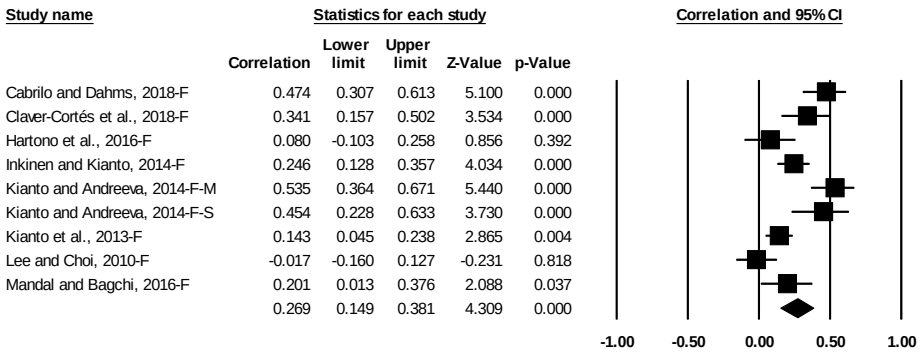


Figure 5-9: Forest plot of the strategic KM-financial performance relationship

5.3.3 Publication bias analysis

The classic fail-safe N test (Rosenthal, 1979) showed the 187 studies with zero effect size were more than 55 ($5k_2+10= 55$, $k_2= 9$) (Rosenthal, 1979, 1991) were needed to change the present significant result. In addition, $N_2/(5k_2+10)= 3.40$ was larger than 1 which suggested that the number of the studies was sufficient for the meta-analysis (Becker, 2005; Mullen *et al*., 2001). Thus, there was no publication bias in this study.

5.3.4 Homogeneity test

This study was heterogeneous due to significance of Q-statistic (Q-statistic= 41.480, p < 0.000, I^2= 80.714>75). I^2 showed 80.714% of the total variance in the effect sizes originated from the variance between studies. The weights were calculated by 2.9 % variance between studies (τ^2= 0.029). Therefore, 80.714% of the total variance in effect

sizes could not be explained by sampling error only. Thus, potential moderators and the root of heterogeneity are explored in the next section.

Table 5-19: Homogeneity test of the strategic KM-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
9	41.480	8	0.000	80.714	0.029	0.020	0.000	0.169

5.3.5 Moderating effect analysis

Differences in none of the dimensions of national culture and economy were evident based on the comparisons of the classified groups, implying that national culture and economy did not affect the strategic KM-financial performance relationship (detailed results can be found in Appendix V). In contrast, significant $Q_{between}$ values indicated that differences in industries ($Q_{between}$: 5.218; df(Q):1; p-value: 0.022**<0.05) played a critical part in the strategic KM-financial performance relationship, but the integrated effect size was larger in manufacturing industries than in service industries ($r_{manufacturing}$= 0.535***> $r_{service}$= 0.237*), which rejected H_{Ic2}. The empirical results are displayed in Table 5-20.

Table 5-20: Categorical moderator test of industries (the strategic KM-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	1	0.535	0.364	0.671	5.440	0.000	Rejected H_{Ic2} [2]
Service	3	0.237	0.025	0.428	2.190	0.029	
Total between	$Q_{between}$: 5.218; df(Q):1; p-value: 0.022***<0.05						

Note: [2] The study of Claver-Cortés *et al*. (2018) was excluded.

5.3.6 Summary of strategic KM-organisational performance relationship meta-analysis

Figure 5-10 indicates that strategic KM was positively related to financial performance (r= 0.269, 95% CI: 0.149, 0.381, Z-value= 4.309, p < 0.001, supported $H3_2$) and this causal relationship was strengthened in the manufacturing industry (rejected H_{Ic2}:

$r_{manufacturing}$= 0.535***> $r_{service}$= 0.237*; $Q_{between}$: 5.218; df(Q):1; p-value: 0.022**<0.05). The precision of the estimation appears to be poor when the number of studies is very small (Borenstein *et al*., 2010), therefore, integrative testing of strategic KM-overall organisational performance and strategic KM-non-financial performance relationship can be found in Appendix III. The moderating effect analysis of these two relationships was not conducted due to the limited number of studies. Significant empirical results on strategic KM and financial performance are shown in Figure 5-10. The next section discusses the meta-analysis of KM strategies and organisational performance.

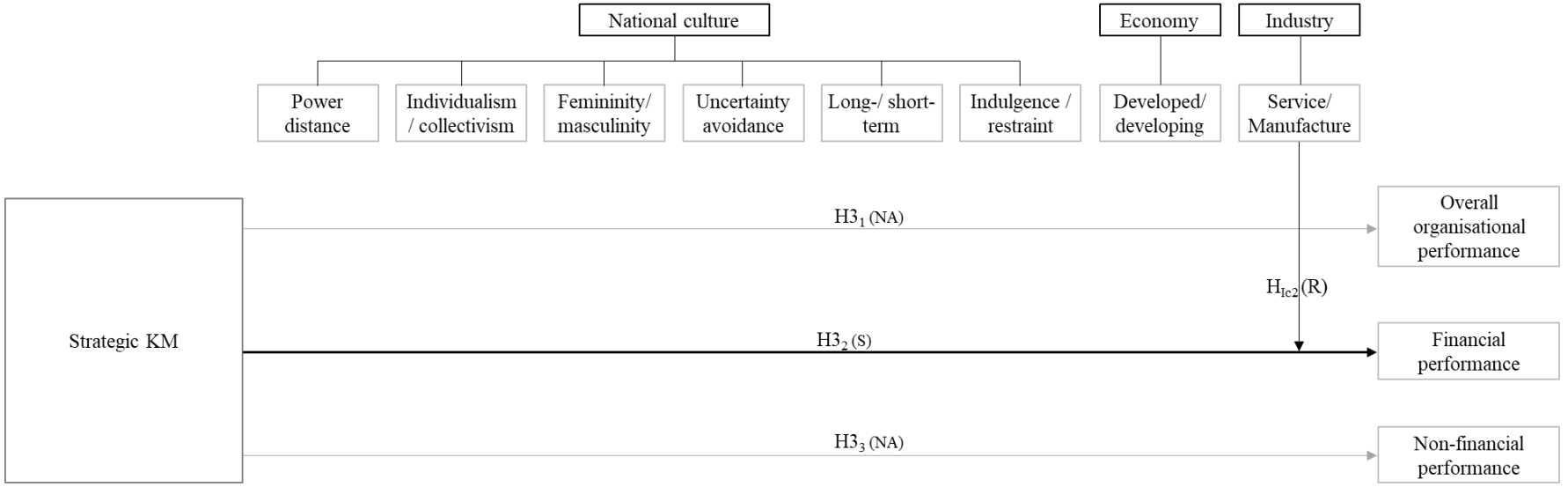


Figure 5-10: Empirical results of strategic KM-organisational performance relationships

5.4 KM strategies and organisational performance

Fourteen studies examined the relationship between the knowledge codification strategy and organisational performance. The meta-analysis of six studies focused on the relationship between knowledge codification strategy-overall organisational performance is shown in Section 5.4.1 The meta-analysis results of five studies which investigated the knowledge codification strategy-financial performance relationship are shown in section 5.4.2. However, only three studies explored the knowledge codification strategy-non-financial performance relationship; descriptive statistics and main effect analysis about these three studies are displayed in Appendix IV (as the number of studies is quite small, publication bias might occur; therefore these studies were dropped.).

Eleven studies scrutinised the relationship between the knowledge personalisation strategy and organisational performance. Among them, five studies focused on financial performance. The meta-analysis of these six studies is set out in section 5.4.3. Nevertheless, four studies investigated the relationship between the knowledge personalisation strategy and financial performance while two examined the personalisation strategy-non-financial performance relationship. Descriptions of these studies are shown in Appendix IV.

5.4.1 The knowledge codification strategy and overall organisational performance

5.4.1.1 Descriptive statistics

Descriptive characteristics of six studies on the relationship between knowledge codification strategy and overall organisational performance are shown in Table 5-21. The effect sizes ranged from -0.19 to 0.483 while the sample sizes varied from 90 to

372 and the total sample size was 1,084. Three studies were in the large power distance group and three in the small power distance group. Five studies were conducted in collective societies while only one study in an individualistic society. Four studies were from feminine regions and two from masculine regions. Two studies were in the group of weak uncertainty avoidance while four in the group of strong uncertainty avoidance. Respondents of five studies were from long-term orientation societies and one from short-term orientation society. Five studies sampled the population in restrained societies plus one study in an indulgence-centred society. All the studies were carried out in the developing economies so that the moderating effect of economies could not be tested. Each group of different industries included two studies.

Table 5-21: Descriptive statistics (the nowledge codification strategy-overall organisational performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Choi and Lee, 2012-C-OP	0.258	372	Korea	S	C	F	S	L	R	Developing	Multiple
2	Hasan *et al*., 2015-C-OP	0.483	192	Indonesia	L	C	F	W	L	R	Developing	Manufacturing
3	Liao, 2011-C-OP	-0.190	111	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
4	Payal *et al*. 2016-C-OP	0.471	100	India	L	I	M	W	L	R	Developing	Service
5	Shahzad *et al*., 2016-C-OP	0.350	219	Pakistan	S	C	M	S	L	R	Developing	Multiple
6	Shehata, 2015-C-OP	0.385	90	Egypt	L	C	F	S	S	R	Developing	Service

5.4.1.2 Main effect analysis

Main effect analysis focused on the relationship between the knowledge codification strategy and overall organisational performance. The results, as shown in Figure 5-11, indicated that the knowledge codification strategy was positively associated with overall organisational performance (r= 0.305, 95% CI: 0.132, 0.460, Z-value= 3.390, p= 0.001 < 0.01), which supported $H4_{11}$.

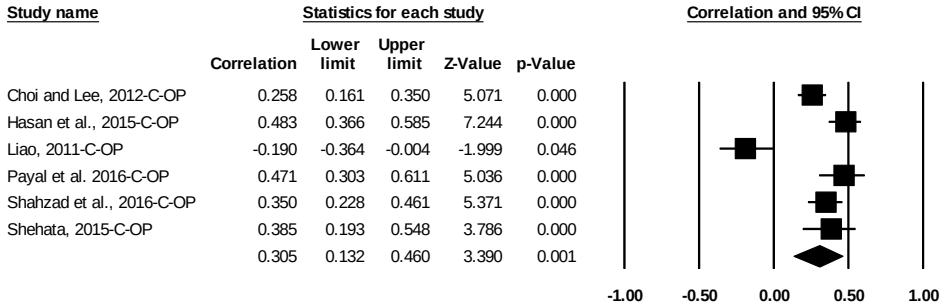


Figure 5-11: Forest plot of the knowledge codification strategy and overall organisational performance relationship

5.4.1.3 Publication bias analysis

The classic fail-safe N test showed that 196 (N_1= 196) studies with zero effect sizes were required to reverse the tested knowledge codification strategy-overall organisational performance relationship into insignificance (Rosenthal, 1979). In addition, 151 was more than 40 ($5k_1$+10= 40, k_1= 6) (Rosenthal, 1979, 1991) and $N_1/(5k_1+10)$= 3.775 was larger than 1 which implied that the number of the studies was sufficient for meta-analysis (Becker, 2005; Mullen *et al*., 2001). Thus, the 'file-drawer' problem was not detected in this study.

5.4.1.4 Homogeneity test

The significance of Q-statistic (Q-statistic= 42.236, p < 0.000, I^2= 88.162>75) indicated that this study was heterogeneous. I^2 suggested 88.162% of the total variance in the

effect sizes resulted from the variance between studies. τ^2= 0.045 implied that 4.5% variance between studies was used for the weight calculation. Moreover, 88.162% of the total variance in effect sizes could not be explained by sampling error only. Thus, the potential moderators and causes of heterogeneity need to be examined.

Table 5-22: Homogeneity test of codification strategy-overall organisational performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
6	42.236	5	0.000	88.162	0.045	0.035	0.001	0.221

5.4.1.5 Moderating effect analysis

Differences in national culture on the knowledge codification strategy-overall organisational performance relationship were significant when national culture was grouped by the degree of indulgence-orientation ($Q_{between}$: 28.923; df(Q):1; p-value: 0.000*** <0.001); Comparisons of other dimensions of national culture were not significantly different, which supported H_{IRdc1} ($r_{indulgence}$= -0.190* < $r_{restrained}$= 0.382***) while H_{PDdc1}, H_{ICdc1}, H_{FMdc1}, H_{UAdc1}, H_{LSdc1} were not supported, as shown in Table 5-23. However, differences in economies could not be compared because all the examined studies were conducted in developing economies. On the other hand, differences in industries did not impact the knowledge codification strategy-overall organisational performance relationship according to categorical moderator analysis. Detailed statistics can be found in Appendix V.

Table 5-23: Categorical moderator test of national culture (the knowledge codification strategy-overall organisational performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	3	0.458	0.374	0.534	9.553	0.000	Not supported H_{PDdc1}
Power distance (S)	3	0.154	-0.116	0.404	1.121	0.262	
Total between	$Q_{between}$: 5.231; df(Q):1; p-value: 0.022[8]						
Collectivism (C)	5	0.271	0.074	0.447	2.678	0.007	

[8] Though the $Q_{between}$ is significant, (1) zero is included between lower limited and upper limited (2) p-value is insignificant when test the effect size from small power distance regions, therefore, H_{PDdc1} was not supported. Similarly, H_{UAdc1} was not s upported.

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Individualism (I)	1	0.471	0.303	0.611	5.036	0.000	Not supported H_{ICdc1}
Total between	$Q_{between}$: 2.584; df(Q):1; p-value: 0.108						
Femininity (F)	4	0.249	-0.015	0.480	1.851	0.064	Not supported H_{FMdc1}
Masculinity (M)	2	0.396	0.274	0.506	5.958	0.000	
Total between	$Q_{between}$: 1.145; df(Q):1; p-value: 0.285						
Uncertainty avoidance (S)	4	0.211	-0.008	0.410	1.891	0.059	Not supported H_{UAdc1}
Uncertainty avoidance (W)	2	0.479	0.385	0.563	8.821	0.000	
Total between	$Q_{between}$: 5.796; df(Q):1; p-value: 0.016						
Long-term orientation (L)	5	0.289	0.088	0.468	2.780	0.005	Not supported H_{LSdc1}
Short-term orientation (S)	1	0.385	0.193	0.548	3.786	0.000	
Total between	$Q_{between}$: 0.508df(Q):1; p-value: 0.476						
Indulgence (I)	1	-0.190	-0.364	-0.004	-1.999	0.046	Supported H_{IRdc1}
Restrained (R)	5	0.382	0.285	0.472	7.173	0.000	
Total between	$Q_{between}$: 28.538; df(Q):1; p-value: 0.000***<0.001						

5.4.2 The knowledge codification strategy and financial performance

5.4.2.1 Descriptive statistics

Descriptive statistics of five studies which explored the relationship between knowledge codification strategy and financial performance are shown in Table 5-24. Among these studies, the effect sizes were from 0.128 to 0.405 while the sample sizes ranged from 112 to 191, and the overall sample size was 740. All of the studies were implemented in small power distance regions. Three studies were from collective regions while two from individualistic regions. Four studies collected data in feminine areas and one in a masculine area. Similarly, four studies were from strong uncertainty avoidance regions and one from a weak uncertainty avoidance region. Four studies were in the long-term orientation culture group and one in the short-term orientation culture group. Four studies were from indulgence-oriented culture and one from restrained culture. Surveys were administered in four developing economies and one developed economy. Two studies used data from the manufacturing industry, plus one study in the service industry and two in multiple industries.

Table 5-24: Descriptive statistics (the knowledge codification strategy-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Chen and Huang, 2014-C-F	0.405	161	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
2	Chiang and Shih, 2011-C-F	0.250	130	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
3	Cohen and Olsen, 2015-C-F	0.262	112	South Africa	S	I	M	W	S	I	Developing	Service
4	Ling, 2013-C-F	0.321	146	Taiwan (China)	S	C	F	S	L	I	Developing	Multiple
5	Sánchez *et al*., 2015-C-F	0.128	191	Spain	S	I	F	S	L	R	Developed	Multiple

5.4.2.2 Main effect analysis

A positive comprehensive effect size (r= 0.274, 95% CI: 0.174, 0.369, Z-value= 5.210, $p < 0.001$) was obtained according to the meta-analysis, suggesting that the knowledge codification strategy was positively related to the financial performance of firms, which supported $H4b_{12}$.

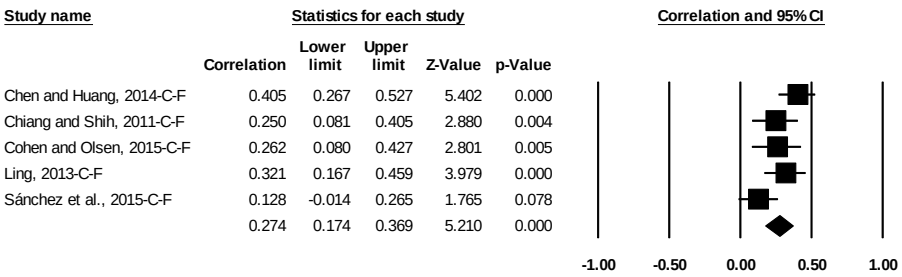


Figure 5-12: Forest plot of the knowledge codification strategy and financial performance relationship

5.4.2.3 Publication bias analysis

The classic fail-safe N test (Rosenthal, 1979) showed that 69 (N_2) studies with zero effect sizes included in the dataset could have changed the significant relationship between the knowledge codification strategy and financial performance relationship into insignificant. In addition, 69 was larger than 35 ($5k_2+10= 35$, $k_2= 5$) (Rosenthal, 1979, 1991) and $N_2/(5k_2+10)= 1.971$ was more than 1 which suggested that the number of the studies was sufficient for meta-analysis (Becker, 2005; Mullen *et al*., 2001). Thus, publication bias was not evident in this study.

5.4.2.4 Homogeneity test

The significant Q-statistic (Q-statistic= 8.332, $p < 0.000$, $I^2= 51.991$) indicated that the degree of heterogeneity of this study was between low and medium ($25 < I^2= 51.991 <55$) (Huedo-Medina *et al*., 2006; Noel and Todd, 2012). I^2 suggested 51.991% of the

total variance in the effect sizes resulted from the variance between studies. τ^2= 0.008 implied that 0.8% variance between studies was used for weight calculation. Moreover, 51.991% of the total variance in effect sizes could not be explained only by sampling error. Thus, potential moderators and causes of heterogeneity need to be examined.

Table 5-25: Homogeneity test of the codification strategy-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
5	8.332	4	0.080	51.991	0.008	0.010	0.000	0.087

5.4.2.5 Moderating effect analysis

As shown in Table 5-26, different degrees of femininity, uncertainty avoidance, and long-term orientation did not affect the effect sizes of the knowledge codification strategy-financial performance relationship due to insignificant $Q_{between}$ values, which did not support H_{FMdc2}, H_{UAdc2}, and H_{LSdc2} while H_{IRdc2} was also not supported due to insignificant effect size of restrained culture. In contrast, significant $Q_{between}$ values were found when compared in the differences in collectivism and individualism ($Q_{between}$: 3.568; df(Q):1; p-value: 0.059*<0.1), which supported H_{ICdc2}, indicating that different extents of collectivism affected the relationship between the knowledge codification strategy and financial performance. On the other hand, comparisons of and economy and industries were not obvious in affecting the knowledge codification strategy-financial performance relationship due to the insignificant $Q_{between}$ value. Details can be found in Appendix V.

Table 5-26: Categorical moderator test of national culture (the knowledge codification strategy-financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	0	NA	NA	NA	NA	NA	NA
Power distance (S)	5	NA	NA	NA	NA	NA	
Total between	$Q_{between}$: NA						
Collectivism (C)	3	0.332	0.241	0.417	6.848	0.000	Supported H_{ICdc2}
Individualism (I)	2	0.183	0.051	0.308	2.700	0.007	

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Total between	$Q_{between}$: 3.568; df(Q):1; p-value: 0.059*<0.1						
Femininity (F)	4	0.277	0.151	0.394	4.220	0.000	Not supported H_{FMdc2}
Masculinity (M)	1	0.262	0.080	0.427	2.801	0.005	
Total between	$Q_{between}$: 0.019; df(Q):1; p-value: 0.890						
Uncertainty avoidance (S)	4	0.277	0.151	0.394	4.220	0.000	Not supported H_{UAdc2}
Uncertainty avoidance (W)	1	0.262	0.080	0.427	2.801	0.005	
Total between	$Q_{between}$: 0.019; df(Q):1; p-value: 0.890						
Long-term orientation (L)	4	0.277	0.151	0.394	4.220	0.000	Not supported H_{LSdcc2}
Short-term orientation (S)	1	0.262	0.080	0.427	2.801	0.005	
Total between	$Q_{between}$: 0.019; df(Q):1; p-value: 0.890						
Indulgence (I)	4	0.318	0.241	0.392	7.646	0.000	Not supported H_{IRdc2}
Restrained (R)	1	0.128	-0.014	0.265	1.765	0.078	
Total between	$Q_{between}$: 5.639; df(Q):1; p-value: 0.018						

5.4.3 The knowledge personalisation strategy and overall organisational performance

5.4.3.1 Descriptive statistics

The characteristics of five studies that examined the relationship between the knowledge personalisation strategy and the overall organisational performance are displayed in Table 5-27. Regarding these six studies, the effect sizes varied from 0.001 to 0.377 while the sample sizes were from 100 to 372, and the total sample size was 994. Three studies were carried out in small power distance regions plus two in large power distance regions. Four studies were from collective societies and two from individualistic societies. Three studies were in the feminine group and two in the masculine group. Likewise, the subjects of three studies were from strong uncertainty avoidance areas and two from weak uncertainty avoidance areas. All five studies were implemented in long-term orientation regions. Four studies were from restrained culture regions and one study from an indulgent culture region. In addition, all five studies were from developing economies. Two studies collated data in multiple industries, two in the manufacturing industry, and one in the service industry.

Table 5-27: Descriptive statistics (the knowledge personalisation strategy-overall organisational performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Choi and Lee, 2012-P-OP	0.001	372	Korea	S	C	F	S	L	R	Developing	Multiple
2	Hasan *et al*., 2015-P-OP	0.377	192	Indonesia	L	C	F	W	L	R	Developing	Manufacturing
3	Liao, 2011-P-OP	0.250	111	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
4	Payal *et al*. 2016-P-OP	0.375	100	India	L	I	M	W	L	R	Developing	Service
5	Shahzad *et al*., 2016-P-OP	0.051	219	Pakistan	S	C	M	S	L	R	Developing	Multiple

5.4.3.2 Main effect analysis

As shown in Figure 5-13, a positive integrated effect size (r= 0.208, 95% CI: 0.036, 0.368, Z-value= 2.362, p= 0.018< 0.1) showed that the knowledge personalisation strategy was positively related to overall organisational performance, which supported $H4_{21}$.

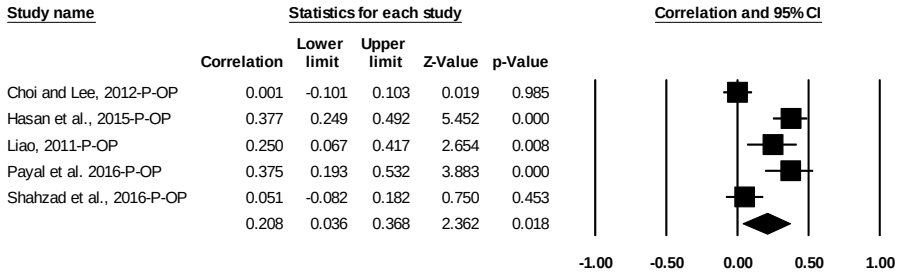


Figure 5-13: Forest plot of the personalisation strategy and overall organisational performance relationship

5.4.3.3 Publication bias analysis

The classic fail-safe N test (Rosenthal, 1979) showed that the significant relationship between the knowledge personalisation strategy and overall organisational performance could be changed into insignificant if more than 38 studies with zero effect sizes were added into the dataset. In addition, 38 was more than 35 ($5k_3+10= 35$, $k_3= 5$) (Rosenthal, 1979, 1991) and $N_3/(5k_3+10)= 1.086$ was larger than 1 which implied that the number of studies was adequate for meta-analysis (Becker, 2005; Mullen *et al*., 2001). Thus, the 'file-drawer' problem was not detected in this study.

5.4.3.4 Homogeneity test

The homogeneity statistic showed that this study was heterogeneous (Q-statistic= 28.754, $p < 0.001$, $I^2= 86.089> 75$) because I^2 was larger than 75. It also suggested 86.272% of the total variance in the effect sizes resulted from the variance between

studies, while τ^2= 0.034 meant that 3.4% variance between studies was used to calculate the weights. Therefore, the 86.089% of the total variance in effect sizes could not be interpreted merely by the sampling error; further inspection for potential moderators to explain the heterogeneity is needed.

Table 5-28: Homogeneity test of the knowledge personalisation strategy-overall organisational performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
5	28.754	4	0.000	86.089	0.034	0.029	0.001	0.184

5.4.3.5 Moderating effect analysis

National culture and industry type did not influence the knowledge personalisation strategy-overall organisational performance relationship according to the empirical tests. Details can be found in Appendix V.

5.4.4 Summary of KM strategies-organisational performance relationship meta-analysis

As shown in Figure 5-14, the knowledge codification strategy was positively related to overall organisational performance (r= 0.305, 95% CI: 0.132, 0.460, Z-value= 3.390, p= 0.001 < 0.01) and financial performance (r= 0.274, 95% CI: 0.174, 0.369Z-value= 5.210, p < 0.001), which supported H4a_{11} and H4a_{12}. In addition, different degrees of indulgence ($Q_{between}$: 28.538; df(Q):1; p-value: 0.000***< 0.001) of national culture impacted on the knowledge codification strategy-overall organisational performance relationship, which supported H_{IRdc1}. On the other hand, comparisons between collectivism and individualism ($Q_{between}$: 3.568; df(Q):1; p-value: 0.059*< 0.1) on the knowledge codification strategy-financial performance relationship were significantly different according to categorical moderator test, which supported H_{ICdc2}. Comparisons of the economies and industries on the knowledge codification strategy-overall

organisational performance relationship as well as the codification strategy-financial performance relationship did not reveal any differences.

The empirical results also showed that the knowledge personalisation strategy was associated with overall organisational performance (r= 0.208, 95% CI: 0.036, 0.368, Z-value= 2.362, p= 0.018< 0.1), which supported $H4_{21}$. Differences in national culture and industries were not obvious in affecting the knowledge personalisation strategy-overall organisational performance relationship, which did not support the assumptions. Figure 5-15 summarises the significant empirical results of the knowledge personalisation strategy-organisational performance relationships.

However, the studies on the knowledge codification strategy-non-financial performance relationship, the knowledge personalisation strategy-financial performance relationship, and the knowledge personalisation strategy-non-financial performance relationship were not analysed due to the limited number of studies but information on these studies can be found in Appendix IV. The meta-analysis of KM-supportive IT and organisational performance are discussed in the next section.

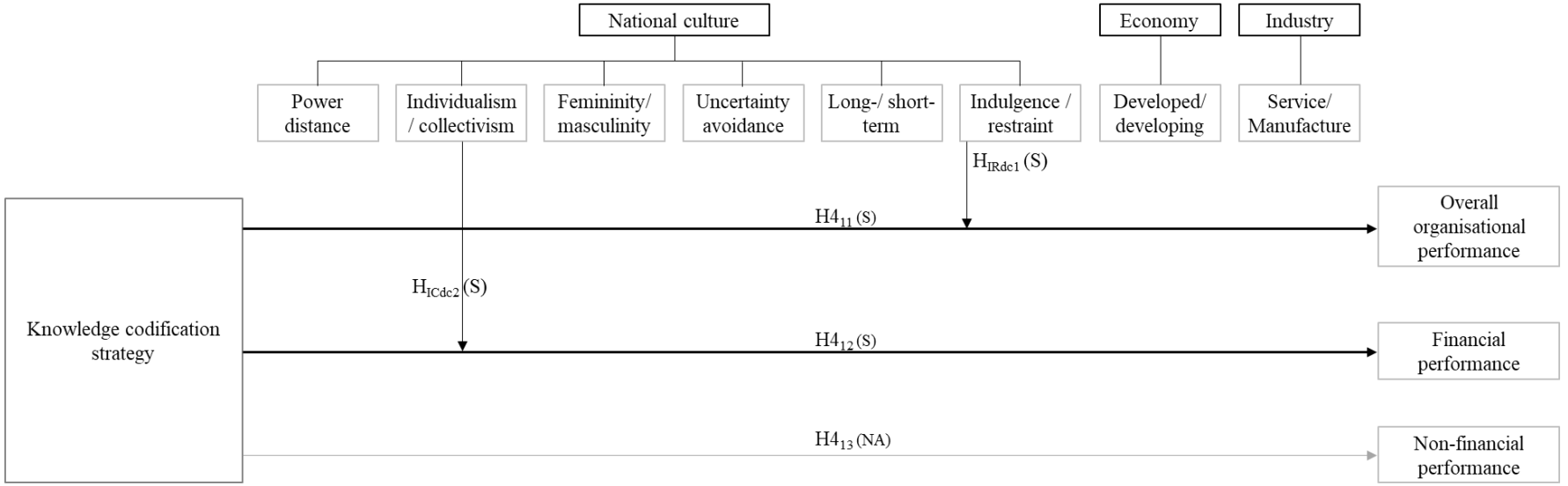


Figure 5-14: Empirical results of knowledge codification strategy-organisational performance relationships

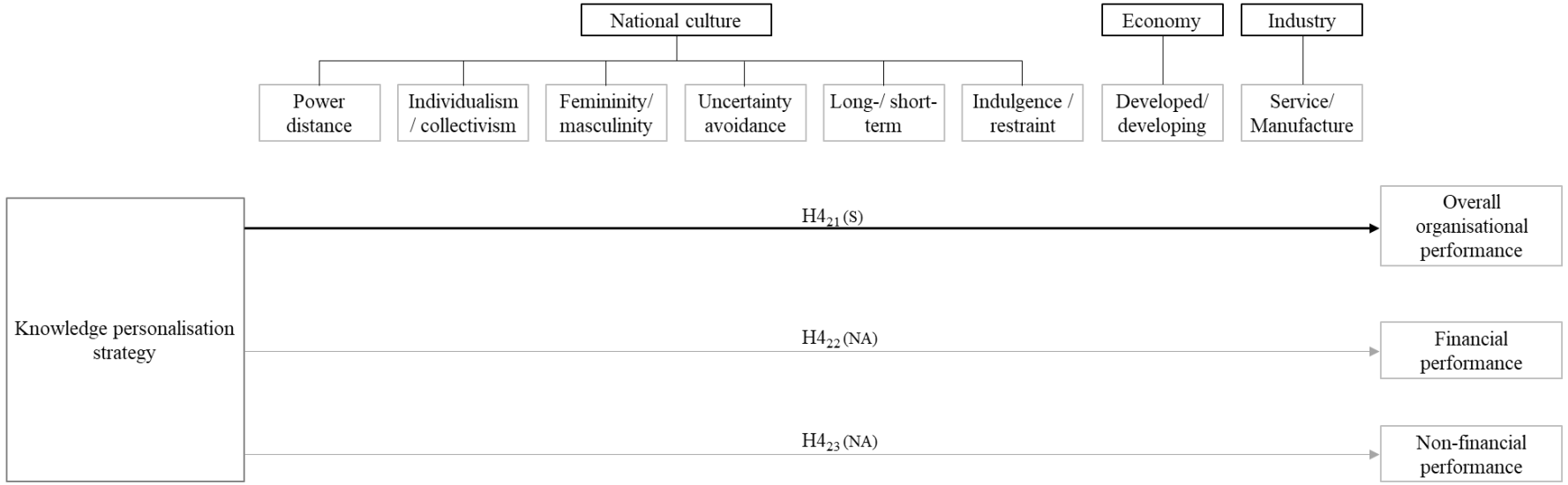


Figure 5-15: Empirical results of knowledge personalisation strategy-organisational performance relationships

5.5 KM-supportive IT and organisational performance

Fifty-four pairwise effect sizes of the KM-supportive IT-organisational performance relationship in forty studies were identified. Among them, twenty effect sizes were obtained from the KM-supportive IT-overall organisational performance relationship; fourteen effect sizes from studies that explored the relationship between KM-supportive IT and financial performance and nineteen effect sizes identified from the studies that tested the relationship between KM-supportive IT and non-financial performance. This section presents the empirical results of the meta-analysis of KM-supportive IT-organisational performance relationships.

5.5.1 KM-supportive IT and overall organisational performance

5.5.1.1 Descriptive statistics

Descriptive statistics of twenty studies that explored the relationship between KM-supportive IT and overall organisational performance are shown in Table 5-29. Among these twenty studies, the effect sizes ranged from -0.16 to 0.963 while sample sizes varied from 89 to 1,597 and the total sample size was 5,260. Twelve studies were from large power distance regions and seven studies were from small power distance regions [1]. Thirteen studies were carried out in collective societies and six in individualistic societies [1]. Fourteen studies collected data in masculine regions and five in feminine regions [1]. Twelve studies were conducted in weak uncertainty avoidance societies and seven in strong uncertainty avoidance societies [1]. Thirteen studies were found in long-term orientation regions and five in short-term orientation regions [1,2]. Seven studies were grouped into indulgence-oriented culture plus ten into the restrained culture group [1, 2, 3]. Eighteen studies were in the group of developing economies and only two in the group of developed economies. Six studies gathered information from multiple

industries, plus eight from the manufacturing industry and four studies from the service industries [4].

Table 5-29: Descriptive statistics (the KM-supportive IT-overall organisational performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Boumarafi and Jabnoun, 2008-OP	0.256	89	UAE	L	C	M	S	NA	NA	Developing	Multiple
2	Chen *et al*., 2011-OP	0.787	556	China	L	C	M	W	L	R	Developing	Service
3	Choe, 2016-OP	0.472	117	Korea	S	C	F	S	L	R	Developing	Manufacturing
4	Chuang *et al*., 2013-OP	0.435	119	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
5	Fong and Chen, 2012-OP	0.270	149	China	L	C	M	W	L	R	Developing	Service
6	Huang *et al*., 2010-OP	0.680	170	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
7	Jain and Moreno, 2015-OP	0.500	205	India	L	I	M	W	L	R	Developing	Manufacturing
8	Kamath *et al*., 2016-OP	0.450	249	India	L	I	M	W	L	R	Developing	Manufacturing
9	Kamhawi, 2012-OP	0.310	167	Bahraini	NA	NA	NA	NA	NA	NA	Developing	Multiple
10	Kroh *et al*., 2018-OP	0.260	116	Germany and Austria	S	I	M	S	L	NA	Developed	Multiple
11	Li and Han, 2008-OP	-0.160	126	China	L	C	M	W	L	R	Developing	Multiple
12	Lin *et al*., 2009-OP	0.459	236	China	L	C	M	W	L	R	Developing	Multiple
13	Mageswari *et al*., 2017-OP	0.122	251	Malaysia	L	C	M	W	S	I	Developing	Manufacturing
14	Matin and Sabagh, 2015-OP	-0.100	148	Iran	S	I	F	W	S	R	Developing	Unclear
15	Migdadi, 2009-OP	0.963	418	Saudi Arabia	L	C	M	S	S	I	Developing	Unclear
16	Payal *et al*. 2016-OP	0.355	100	India	L	I	M	W	L	R	Developing	Service
17	Pee *et al*., 2010-OP	0.320	101	Singapore	L	C	M	W	L	R	Developing	Service
18	Samson *et al*., 2017-OP	0.546	1,597	Australia	S	I	M	W	S	I	Developed	Multiple
19	Wang *et al*., 2007-OP	0.260	113	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
20	Wong and Wong, 2011-OP	0.415	233	Malaysia	L	C	M	W	S	I	Developing	Manufacturing

Note: [1] Respondents of Kamhawi (2012)'s study were from Bahrain where Hofstede national culture scores are not available. [2] Boumarafi and Jabnoun (2008)'s study was carried out in the UAE in which scores of indulgence and long-term orientation are not obtainable while [3]Kroh *et al*. (2018) sampled their study in Germany and Austria where the degree of indulgence is different. Therefore, unavailable classifications of national culture dimensions were abstained when moderating effects of these dimensions of national culture were tested.[4] The study of Matin and Sabagh (2015) and Migdadi (2009) did not specify the industries in which they collected data; in hence, these two studies were dropped when the categorical moderating effect of the industry was analysed.

5.5.1.2 Main effect analysis

A positive accumulated effect size suggested that KM-supportive IT positively affected overall organisational performance (r= 0.440, 95% CI: 0.241, 0.604, Z-value= 4.077, p < 0.001), which supported $H5_1$.

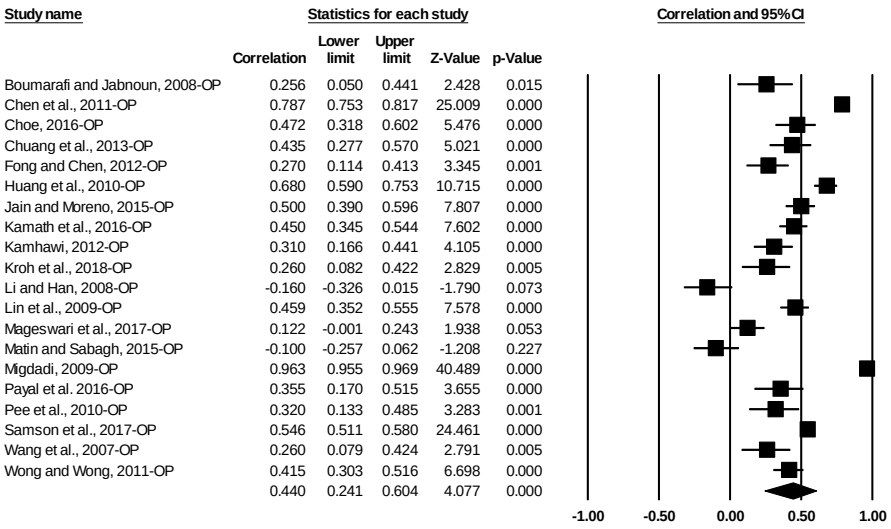


Figure 5-16: Forest plot of the KM-supportive IT-overall organisational performance relationship

5.5.1.3 Publication bias analysis

The classic fail-safe N test (Rosenthal, 1979) suggested 6,832 (N_1) studies with zero effect, more than 110 ($5k_1+10= 110$, $k_1= 20$) (Rosenthal, 1979, 1991), should have been included in the sample if the integrated positive association between KM-supportive IT and overall organisational performance would have changed. In addition, $N_1/(5k_1+10)= 62.109$ was larger than 1 which implied that the number of the studies was sufficient for this meta-analysis (Becker, 2005; Mullen *et al.*, 2001). Therefore, the issue of file-drawer did not affect the current conclusion.

5.5.1.4 Homogeneity test

The homogeneity test showed that this study was heterogeneous (Q-statistic= 1207.248, p < 0.000, I^2= 98.426) because of the large portion of I^2 (I^2= 98.426>75) (Huedo-Medina *et al*., 2006; Noel and Todd, 2012). I^2 implied 98.426% of the total variance in the effect sizes resulted from the variance between studies. τ^2= 0.262 means 26.2 % variance between studies was used to calculate weights. Thus, potential moderators and the cause of the heterogeneity are worthy of investigating.

Table 5-30: Homogeneity test of the KM-supportive IT-overall organisational performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
20	1243.845	19	0.000	98.472	0.262	0.124	0.015	0.512

5.5.1.5 Moderating effect analysis

None of contextual (national culture, economy, and industry) differences were statistically significant, based on the categorical moderating test for the KM-supportive IT-overall organisational performance relationship. Detailed results are shown in Appendix V.

5.5.2 KM-supportive IT and financial performance

5.5.2.1 Descriptive statistics

Fourteen pairwise effect sizes from thirteen studies were tested by the meta-analysis approach concerning relationships between KM-supportive IT and financial performance. The descriptive characteristics of these fourteen studies are set out in Table 5-31. Among these fourteen effect sizes, the minimum effect size was 0.032 and the maximum effect size was 0.687. The sample sizes ranged from 61 to 598 and the total sample size was 3,046. Nine studies were from small power distance societies and

three from large power distance societies [1]. Six studies were in the collectivism group and six in the individualism group [1]. Eight studies were conducted in feminine societies and four in masculine societies [1]. Respondents of seven studies were from strong uncertainty avoidance regions and five from weak uncertainty regions [1]. Six studies collected data in long-term oriented societies and six in short-term oriented societies [1]. Eight studies were in the indulgence-oriented culture group and four in the restrained culture group [1]. In addition, seven studies were carried out in developing economies and five from developed economies [1]. Seven studies applied data from multiple industries and four from the manufacturing industry, as well as three from service industries.

Table 5-31: Descriptive statistics (the KM-supportive IT-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Chen and Liang, 2011-F	0.490	97	Taiwan (China)	S	C	F	S	L	I	Developing	Multiple
2	Chen *et al*., 2008-F	0.640	150	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
3	Cohen and Olsen, 2015-F	0.410	112	South Africa	S	I	M	W	S	I	Developing	Service
4	Hartono *et al*., 2016-F	0.270	117	Indonesia	L	C	F	W	L	R	Developing	Service
5	Inkinen and Kianto, 2014-F	0.193	261	Finland	S	I	F	W	S	I	Developed	Multiple
6	Kianto and Andreeva, 2014-P-F [1]	0.424	86	Finland, China, Russia	NA	NA	NA	NA	NA	NA	NA	Manufacturing
7	Kianto and Andreeva, 2014-S-F [1]	0.435	61	Finland, China, Russia	NA	NA	NA	NA	NA	NA	NA	Service
8	Kianto *et al*., 2013-F	0.078	399	Finland	S	I	F	W	S	I	Developed	Multiple
9	Kraśnicka *et al*., 2018-F	0.255	301	Poland	L	I	M	S	S	R	Developed	Multiple
10	Lee and Lee, 2007-F	0.399	215	Korea	S	C	F	S	L	R	Developing	Multiple
11	Maiga *et al*., 2013-F	0.300	598	US	S	I	M	W	S	I	Developed	Manufacturing
12	Roldán *et al*., 2014-F	0.331	82	Spain	S	I	F	S	L	R	Developed	Multiple
13	Shih *et al*., 2009-F	0.032	155	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
14	Valdez-Juárez *et al*., 2018-F	0.687	412	Mexico	L	C	M	S	S	I	Developing	Multiple

Note: [1] The data in Kianto and Andreeva (2014)'s study was from Finland, China and Russia where national cultures and economies are different. Therefore, this study was dropped out when moderating effects of national culture and economy were examined.

5.5.2.2 Main effect analysis

A positive relationship between KM-supportive IT and financial performance was revealed based on empirical testing (r= 0.366, 95% CI: 0.240, 0.481, Z-value= 5.403, p < 0.001), which supported $H5_2$.

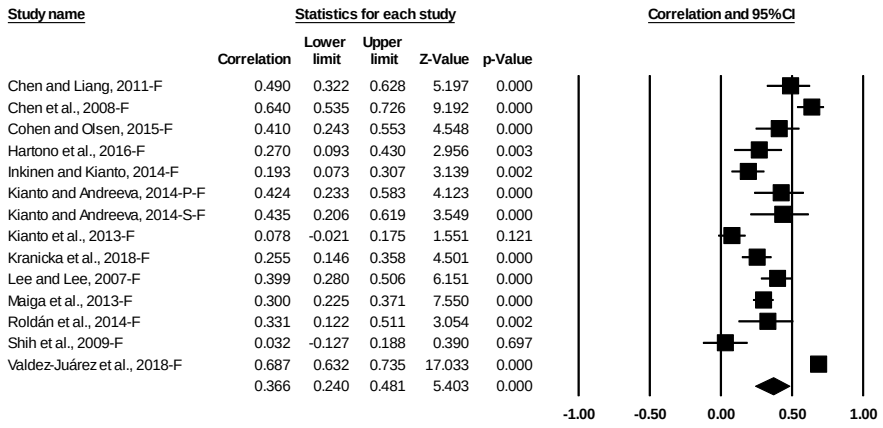


Figure 5-17: Forest plot of the KM-supportive IT-financial performance relationship

5.5.2.3 Publication bias analysis

The classic fail-safe N test (Rosenthal, 1979) showed that 1,371 (N_2) studies 1,371 with zero effect sizes, more than 80 ($5k_2+10$= 80, k_2= 14) (Rosenthal, 1979, 1991) were needed to reverse the present relationship between KM-supportive IT and financial performance. Additionally, $N_2/(5k_2+10)$= 17.138 was larger than 1 which indicated that the number of studies was sufficient for meta-analysis (Becker, 2005; Mullen *et al.*, 2001). Therefore, there was no bias in this study.

5.5.2.4 Homogeneity test

This study was heterogenous according to homogeneity statistic (Q-statistic= 183.932, p < 0.000, I^2= 92.932>75). I^2 denoted that 92.396 % of the total variance in the effect sizes was due to variance between studies and τ^2= 0.064 implied 6.4% variance between studies was used to calculate weights. Thus, overall variation in effect sizes could not

be understood by sampling error only, and therefore it is essential to examine the effects of potential moderators and the reasons for the heterogeneity.

Table 5-32: Homogeneity test of the KM-supportive IT-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
14	183.932	13	0.000	92.932	0.064	0.032	0.001	0.253

5.5.2.5 Moderating effect analysis

The differences between the developed economies and developing economies was significant according to the significance of the $Q_{between}$ value ($Q_{between}$: 3.726; df(Q):1; p-value: 0.054*<0.1), but the overall effect size in developing countries was larger than in developed countries ($r_{developing}$= 0.442***> $r_{developed}$= 0.224***), which rejected H_{Ee1}, as shown in Table 5-33. On the other hand, national culture and industry did not affect the KM-supportive IT-financial performance relationship. Details of the testing can be found in Appendix V.

Table 5-33: Categorical moderator test of economies (the KM-supportive IT-financial performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	5	0.224	0.129	0.315	4.535	0.000	Rejected H_{Ee2} [1]
Developing economies	7	0.442	0.240	0.607	4.045	0.000	
Total between	$Q_{between}$: 3.726; df(Q):1; p-value: 0.054*<0.1						

Note: [1] The study of Kianto and Andreeva (2014) was excluded.

5.5.3 KM-supportive IT and non-financial performance

5.5.3.1 Descriptive statistics

Table 5-34 gives descriptions of eighteen studies with nineteen pairwise effect sizes between the KM-supportive IT and non-financial performance. The effect sizes ranged from 0.075 to 0.743, the sample sizes varied from 89 to 598 and the total sample size was 3,747. Eleven studies were in the small power distance group and six in the large power distance group [2]. Twelve studies were conducted in collective societies while

four were in individualistic societies [2,3]. Nine studies collected data in masculine countries while seven were in feminine societies [2,3]. Eight studies were from weak uncertainty avoidance regions and nine from strong uncertainty avoidance regions [2]. Respondents of eight studies were in long-term oriented societies and seven in short-term oriented societies [1,2]. Eleven studies were in indulgence-oriented societies while three were in restrained culture [1,2,3]. Fourteen studies were in the developing economies group and two in the developed economies group. Seven studies obtained their data from multiple industries, plus seven from the manufacturing industry and three from the service industries.

Table 5-34: Descriptive statistics (the KM-supportive IT-non-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Boumarafi and Jabnoun, 2008-NF [1]	0.530	89	UAE	L	C	M	S	NA	NA	Developing	Multiple
2	Chen and Liang, 2011-NF	0.575	97	Taiwan (China)	S	C	F	S	L	I	Developing	Multiple
3	Chong *et al*., 2011-NF [4]	0.206	203	Malaysia	L	C	M	W	S	I	Developing	Government
4	Chuang *et al*., 2013-NF	0.366	119	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
5	Cohen and Olsen, 2015-NF	0.228	112	South Africa	S	I	M	W	S	I	Developing	Service
6	Huang *et al*., 2010-NF	0.250	170	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
7	Kianto and Andreeva, 2014-P-NF [2]	0.425	175	Finland, China, Russia	NA	NA	NA	NA	NA	NA	NA	Manufacturing
8	Kianto and Andreeva, 2014-S-NF [2]	0.347	120	Finland, China, Russia	NA	NA	NA	NA	NA	NA	NA	Service
9	Kim and Hancer, 2010-NF	0.440	179	US	S	I	M	W	S	I	Developed	Service
10	Lee and Lee, 2007-NF	0.456	215	Korea	S	C	F	S	L	R	Developing	Multiple
11	Lee *et al*., 2012-NF	0.508	105	Korea	S	C	F	S	L	R	Developing	Multiple
12	Liang *et al*., 2013-NF [3]	0.743	213	Taiwan (China), Japan	S	NA	NA	S	L	NA	NA	Unclear
13	Mageswari *et al*., 2017-NF	0.075	251	Malaysia	L	C	M	W	S	I	Developing	Manufacturing
14	Maiga *et al*., 2013-NF	0.374	598	US	S	I	M	W	S	I	Developed	Manufacturing
15	Mills and Smith, 2011-NF [1]	0.576	189	Jamaica	S	I	M	W	NA	NA	Developing	Multiple
16	Shih *et al*., 2009-NF	0.249	155	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
17	Sucahyo *et al.* 2016-NF	0.386	139	Indonesia	L	C	F	W	L	R	Developing	Multiple
18	Tan and Wong, 2015-NF	0.722	206	Malaysia	L	C	M	W	S	I	Developing	Manufacturing
19	Valdez-Juárez *et al*., 2018-NF	0.605	412	Mexico	L	C	M	S	S	I	Developing	Multiple

Note: [1] Boumarafi and Jabnoun (2008) as well Mills and Smith (2011) selected data in the UAE and Jamaica, respectively. The score of the long-term and the score of indulgence are unavailable in these two nations. Thus, these two studies were left out when the moderating effects of the long-term orientation and indulgence were examined. [2] Kianto and Andreeva (2014) conducted surveys in Finland, China and Russia, but these three countries are inconsistent in terms of national culture and economic status. Therefore, this study was excluded when the moderating effects of national culture and economy were investigated. [3] Liang et al. (2013) sampled in Taiwan (China) and Japan, but individualism, masculinity and indulgence are not in the same group of these two regions. Thus, this study was also dropped out when moderating effects of individualism, masculinity and indulgence were tested. [4] Chong *et al*. (2011) conducted their surveys in a department of the Ministry of Finance, Malaysia. [3] Liang *et al* (2013) did not clearly report industries of data selection. Therefore, these two studies were excluded when the moderating effect of industries was tested.

5.5.3.2 Main effect analysis

The empirical results showed that KM-supportive IT was positively associated with non-financial performance (r= 0.442, 95% CI: 0.349, 0.527, Z-value= 8.442, p < 0.001), which supported $H5_3$.

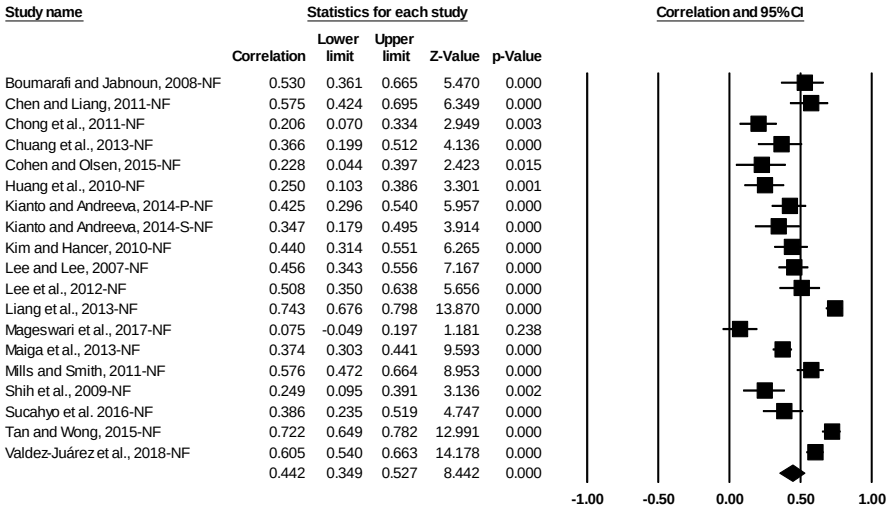


Figure 5-18: Forest plot of the KM-supportive IT-non-financial performance relationship

5.5.3.3 Publication bias analysis

If 3,871 (N_3) studies with zero effect sizes were included in the current study, then the present significant relationship between IT and non-financial performance would have been reversed based on the classic fail-safe N (Rosenthal, 1979) test. In addition, N_3= 3,871 was more than the threshold value: 105 ($5k_3$+10= 105, k_3= 19) (Rosenthal, 1979, 1991). Furthermore, $N_3/(5k_3+10)$ = 36.867 was larger than 1 which indicated that the number of the studies was ample in this meta-analysis (Becker, 2005; Mullen *et al.*, 2001). As a result, there was no publication bias based on statistics.

5.5.3.4 Homogeneity test

The homogeneity statistic (Q-statistic= 202.343, p < 0.000, I^2= 91.104 >75) revealed that this study was heterogeneous since I^2 was larger than 75. I^2 denoted 91.104 % of

the total variance in the effect sizes was due to the variance between studies. 5.4% (τ^2= 0.054) of the variance between studies represented the calculation of the weight. Sampling error could only explain a minor portion (8.896%) of the total variance in effect sizes. Consequently, potential moderators and the cause of the heterogeneity should be analysed.

Table 5-35: Homogeneity test of the KM-supportive IT-non-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
19	202.343	18	0.000	91.104	0.054	0.022	0.000	0.232

5.5.3.5 Moderating effect analysis

There was no evidence that national culture, economy, and industry had an influence on the relationship between KM-supportive IT and non-financial performance because the test was insignificant. Detailed results can be found in Appendix V.

5.5.4 Summary of KM-supportive IT-organisational performance relationship meta-analysis

The significant results, as summarised in Figure 5-19, indicated that KM-supportive IT was positively related to overall organisational performance (r= 0.440, 95% CI: 0.241, 0.604, Z-value= 4.077, p < 0.001), financial performance (r= 0.366, 95% CI: 0.240, 0.481, Z-value= 5.403, p < 0.001), and non-financial performance (r= 0.442, 95% CI: 0.349, 0.527, Z-value= 8.442, p < 0.001), which supported $H5_1$, $H5_2$, and $H5_3$. However, none of dimensions of national culture clearly affected the relationship between KM-supportive IT and organisational performance, which did not support the propositions.

However, the categorical moderator test found developing economies strengthened the KM-supportive IT-financial performance relationship ($r_{developing}$= 0.442*** > $r_{developed}$=

0.224***; $Q_{between}$: 3.726; df(Q):1; p-value: 0.054*<0.1) whereas differences in economies neither affected the KM-supportive IT-overall organisational performance relationship nor the KM-supportive IT-non-financial performance relationship. Thus, H_{Ee2} was rejected, and H_{Ee1} and H_{Ee3} were not supported. The impacts of the industries were not obvious on affecting the KM-supportive IT-organisational performance relationships, which did not support H_{Ie1}, H_{Ie2} and HIe_3. In the next section, the relationships between organisational learning and organisational performance are investigated.

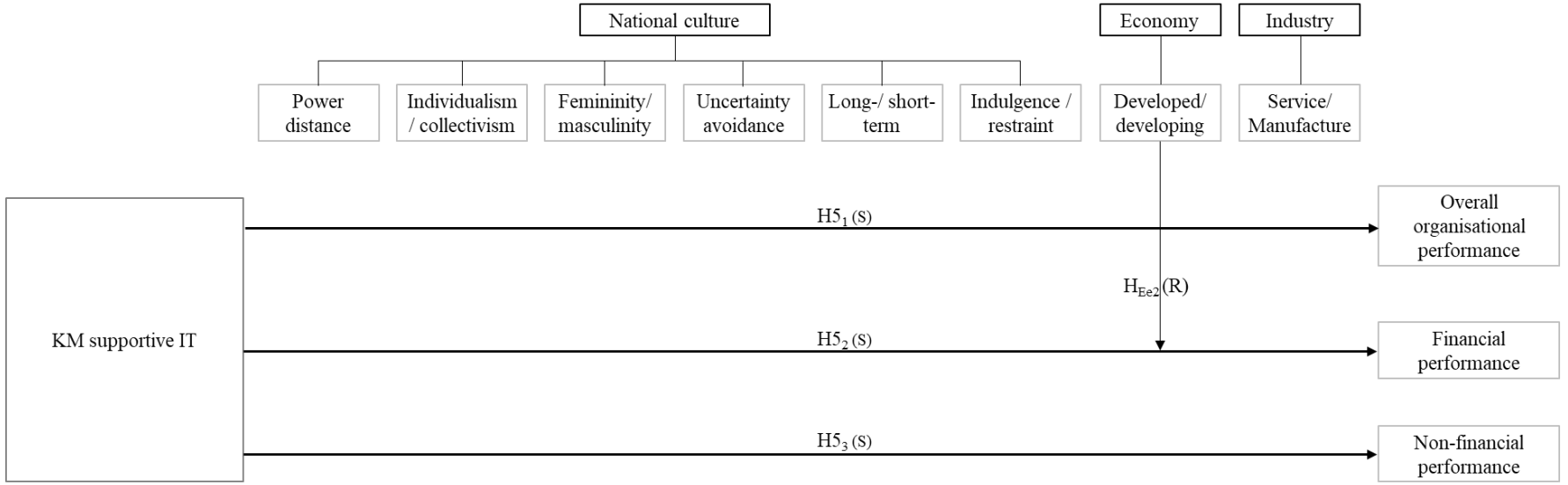


Figure 5-19: Empirical results of KM-supportive IT-organisational performance relationships

5.6 Organisational learning and organisational performance

Fifty pairwise effect sizes from forty-five studies were identified for examining organisational learning-organisational performance relationships. Twenty studies focused on the relationship between organisational learning and overall organisational performance; twenty studies analysed the causal relationship between organisational learning and financial performance while ten studies delved into organisational learning-non-financial performance relationship.

5.6.1 Organisational learning and overall organisational performance

5.6.1.1 Descriptive statistics

As shown in Table 5-36, twenty studies were related to organisational learning and overall organisational performance. The effect sizes of these studies fluctuated from -0.017 to 0.877 while the sample sizes ranged from 70 to 411, and the total sample size was 3,649. Seven studies were from large power distance regions while twelve were from small power distance regions [1]. Twelve studies were carried out in collective societies while seven in individualistic societies. Similarly, eleven studies gathered data from feminine regions and eight from masculine regions. Thirteen studies sampled populations in strong uncertainty avoidance regions while six were in weak uncertainty avoidance regions. Respondents in fourteen studies were from long-term orientated areas and five from short-term oriented areas. Four studies were in indulgence-orientation societies with fifteen in restrained societies. Fourteen studies were administered in developing regions and six in developed regions. Six studies gathered information in service industries while eight were in the manufacturing industry as well as five in multiple industries [2]

Table 5-36: Descriptive statistics (the organisational learning-overall organisational performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Baker and Sinkula, 1999a-OP	0.320	411	Canada	S	I	M	W	S	I	Developed	Multiple
2	Cheng *et al*., 2008-OP	0.488	218	China	L	C	M	W	L	R	Developing	Manufacturing
3	Chien and Tsai, 2012-OP	0.420	132	Taiwan (China)	S	C	F	S	L	I	Developing	Service
4	Choe, 2016-OP	0.436	117	Korea	S	C	F	S	L	R	Developing	Manufacturing
5	Gantasala *et al*., 2010-OP [2]	0.012	92	Jordan	L	C	F	S	S	R	Developing	Unclear
6	Hu, 2013-OP	0.532	158	China	L	C	M	W	L	R	Developing	Service
7	Huang *et al*., 2010-OP	0.080	170	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
8	Hughes *et al*., 2008-OP [1]	0.330	149	Europe	NA	NA	NA	NA	NA	NA	Developed	Manufacturing
9	Hussain *et al*., 2018-OP	0.877	70	Pakistan	S	C	M	S	L	R	Developing	Service
10	Jain and Moreno, 2015-OP	0.451	205	Indian	L	I	M	W	L	R	Developing	Manufacturing
11	Khan *et al*., 2015-OP	-0.017	214	Pakistan	S	C	M	S	L	R	Developing	Service
12	Kharabsheh *et al*., 2014-OP	0.710	264	Jordan	L	C	F	S	S	R	Developing	Multiple
13	Lichtenthaler, 2009-OP	0.277	175	German	S	I	M	S	L	R	Developed	Manufacturing
14	Madani and Ahmadi, 2015-OP	0.774	120	Iran	S	I	F	W	S	R	Developing	Service
15	Noruzy *et al*., 2013-OP	0.590	106	Iran	S	I	F	W	S	R	Developing	Manufacturing
16	Rao *et al*., 2015-OP	0.570	182	China	L	C	M	W	L	R	Developing	Multiple
17	Real *et al*., 2014-OP	0.830	140	Spain	S	I	F	S	L	R	Developed	Manufacturing
18	Rodríguez Antón *et al*., 2016-OP	0.341	349	Spain	S	I	F	S	L	R	Developed	Service
19	Ruiz-Mercader *et al*., 2006-OP	0.252	151	Spain	S	I	F	S	L	R	Developed	Service
20	Sharabati *et al*., 2010-OP	0.564	132	Jordan	L	C	F	S	S	R	Developing	Manufacturing

Note: [1] Hughes *et al*. (2008) conducted their surveys in Europe without mentioning specific countries. Therefore, this study was not encompassed when moderating effects of national culture was analysed. [2] Gantasala *et al*. (2010) did not report data source so that this study was dropped out when the effects of industries were examined.

5.6.1.2 Main effect analysis

A positive integrated effect size r= 0.454 (95% CI: 0.341, 0.554, Z-value= 7.150, p < 0.001) was achieved, which indicated that organisational learning was significantly associated with overall organisational performance, which supported $H6_1$.

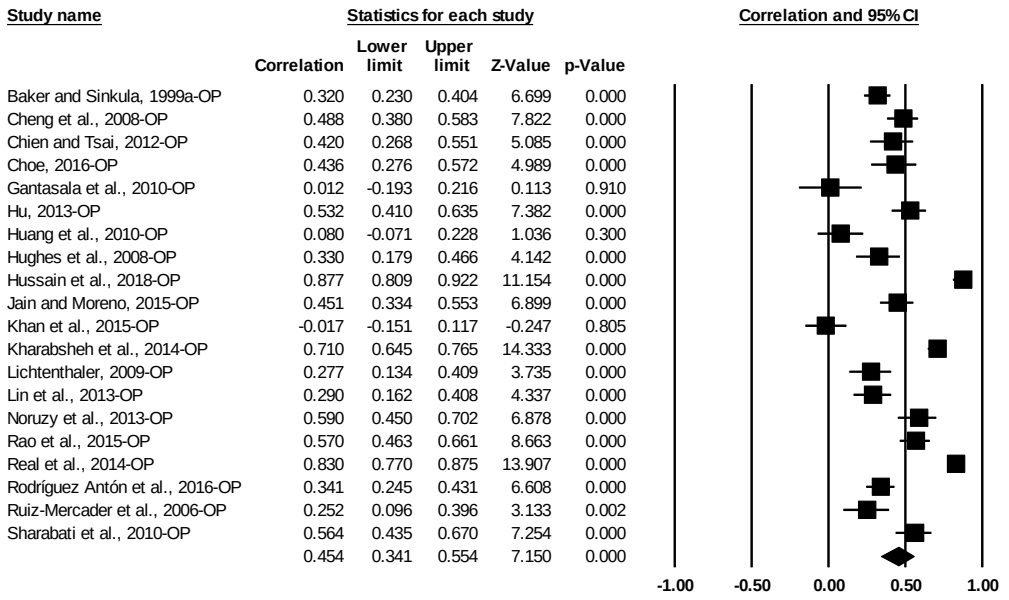


Figure 5-20: Forest plot of the organisational learning-overall organisational performance relationship

5.6.1.3 Publication bias analysis

If 3,978 (N_1) studies with zero effect were added into the data set (Rosenthal, 1979), then the current result would have been conversed based on the classic fail-safe N test. In addition, 3978 was more than 110 ($5k_1+10= 110$, $k_1= 20$) (Rosenthal, 1979, 1991) and $N_1/(5k_1+10)= 36.164$ was larger than 1 which suggested that the number of the studies was sufficient in this meta-analysis (Becker, 2005; Mullen *et al.*, 2001). As a consequence, there was no publication bias.

5.6.1.4 Homogeneity test

The Q-statistic indicates that this study was heterogeneous (Q-statistic= 313.492, p < 0.000, I^2= 93.939>75). I^2 showed 93.939% of the total variance in the effect sizes was due to the variance between studies. τ^2= 0.087 meant 8.7 % variance between studies that calculated the weights. In addition, 93.939% of the total variance in effect sizes cannot be interpreted by sampling error only. Thus, potential moderators and the cause of the heterogeneity should be explored.

Table 5-37: Homogeneity test of the organisational learning-overall organisational performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
20	313.492	19	0.000	93.939	0.087	0.033	0.001	0.295

5.6.1.5 Moderating effect analysis

As shown in Table 5-38, there was a significant difference between indulgence-oriented cultures and restrained cultures ($Q_{between}$: 5.823; df(Q):1; p-value: 0.016*<0.1) on the organisational learning-overall organisational performance relationship and the overall effect size in restraint regions was larger than in indulgence-oriented regions ($r_{restraint}$= 0.504*** > $r_{indulgence}$= 0.281***), supporting H_{IRf1}, however, differences in other dimensions of national culture were not obvious, which did not support H_{PDf1}, H_{ICf1}, H_{FMf1}, H_{UAf1}, and H_{LSf1}. In addition, the $Q_{between}$ values revealed no significant differences between different economies and industries, and details of the test can be found in Appendix V.

Table 5-38: Categorical moderator test of national culture (the organisational learning-overall organisational performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	7	0.501	0.360	0.619	6.217	0.000	Not supported H_{PDf1} [1]
Power distance (S)	12	0.438	0.273	0.578	4.864	0.000	
Total between	$Q_{between}$: 0.379; df(Q):1; p-value: 0.538						
Collectivism (C)	12	0.456	0.287	0.598	4.886	0.000	

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Individualism (I)	7	0.468	0.289	0.615	4.732	0.000	Not supported H_{ICf1} [1]
Total between	$Q_{between}$: 0.010; df(Q):1; p-value: 0.921						
Femininity (F)	11	0.449	0.277	0.594	4.749	0.000	Not supported H_{FMf1} [1]
Masculinity (M)	8	0.475	0.298	0.620	4.834	0.000	
Total between	$Q_{between}$: 0.049; df(Q):1; p-value: 0.824						
Uncertainty avoidance (S)	13	0.445	0.264	0.596	4.503	0.000	Not supported H_{UAf1} [1]
Uncertainty avoidance (W)	6	0.489	0.396	0.571	9.117	0.000	
Total between	$Q_{between}$: 0.211; df(Q):1; p-value: 0.646						
Long-term orientation (L)	14	0.456	0.314	0.578	5.766	0.000	Not supported H_{LSf1} [1]
Short-term orientation (S)	5	0.472	0.220	0.665	3.480	0.001	
Total between	$Q_{between}$: 0.014; df(Q):1; p-value: 0.905						
Indulgence (I)	4	0.281	0.156	0.397	4.302	0.000	Supported H_{IRf1} [1]
Restrained (R)	15	0.504	0.366	0.621	6.341	0.000	
Total between	$Q_{between}$: 5.823; df(Q):1; p-value: 0.016*<0.1						

Note: [1] The study of Hughes *et al.* (2008) was excluded.

5.6.2 Organisational learning and financial performance

5.6.2.1 Descriptive statistics

Descriptive statistics of twenty studies that explored the relationship between organisational learning and financial performance are shown in Table 5-39. Among these studies, the effect sizes ranged from 0.04 to 0.610 while sample sizes varied from 111 to 1,441, and the total sample size was 7,219. Seventeen studies were from small power distance regions and three from large power distance regions. Twelve studies were conducted in individualistic societies and eight in collective societies. Seven studies collected data in masculine regions plus thirteen in feminine regions. Nine studies were in the weak uncertainty avoidance group and ten in the strong uncertainty avoidance group [1]. Twelve studies were implemented in long-term oriented societies and seven in short-term oriented societies [1]. Twelve studies were located in indulgence-oriented regions and seven in restrained regions [1]. Eight studies were from developing economies while eleven were from developed economies and only one from a transition economy. Seven studies collected data from the manufacturing industry and two from service industries, as well as six from multiple industries [2].

Table 5-39: Descriptive statistics (the organisational learning-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Baker and Sinkula, 1999b-F	0.350	411	Canada	S	I	M	W	S	I	Developed	Multiple
2	Chen *et al*., 2008-F	0.610	150	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
3	Feng *et al*., 2014-F	0.557	214	China	L	C	M	W	L	R	Developing	Manufacturing
4	Forés and Camisón, 2011-F	0.320	952	Spain	S	I	F	S	L	R	Developed	Manufacturing
5	García-Morales *et al*., 2007-F [2]	0.414	246	Spain	S	I	F	S	L	R	Developed	Unclear
6	García-Morales *et al*., 2008-F	0.603	408	Spain	S	I	F	S	L	R	Developed	Multiple
7	Inkinen and Kianto, 2014-F	0.285	261	Finland	S	I	F	W	S	I	Developed	Multiple
8	Kianto *et al*., 2013-F	0.159	399	Finland	S	I	F	W	S	I	Developed	Multiple
9	Lee and Huang, 2012-F [1]	0.154	312	USA, Japan, Germany, UK	S	I	M	NA	NA	NA	Developed	Multiple
10	Lee and Lee, 2007-F	0.411	215	Korea	S	C	F	S	L	R	Developing	Multiple
11	Li *et al*., 2011-F [2]	0.279	148	China	L	C	M	W	L	R	Developing	Unclear
12	Maiga *et al*., 2013-F	0.040	598	US	S	I	M	W	S	I	Developed	Manufacturing
13	Pett and Wolff, 2016-F	0.171	117	US	S	I	M	W	S	I	Developed	Manufacturing
14	Rhodes *et al*., 2008-F [2]	0.290	111	Taiwan (China)	S	C	F	S	L	I	Developing	Unclear
15	Roxas *et al.*, 2014-F	0.174	1,441	New Zealand	S	I	M	W	S	I	Developed	Multiple
16	Shih *et al*., 2009-F	0.032	155	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
17	Shirokova *et al*., 2013-F	0.086	500	Russia	L	I	F	S	L	R	Transition	Service
18	Sirén *et al*., 2012-F	0.250	206	Finland	S	I	F	W	S	I	Developed	Service
19	Wang and Fang, 2011-F [2]	0.108	144	Taiwan (China)	S	C	F	S	L	I	Developing	Unclear
20	Wu and Chen, 2014-F	0.050	231	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing

Note: [1] Lee and Huang (2012) conducted surveys in the US, Japan, Germany, and the UK where the classification of uncertain avoidance, long-term orientation, and indulgence are different. Therefore, this study was omitted when moderating effects of uncertain avoidance, long-term orientation, and indulgence were calculated. [2] García-Morales *et al*. (2007); Li *et al*. (2011), Rhodes *et al*. (2008), and Wang and Fang (2011) did not list detailed industries in which they collated information. Thus, these two studies were dropped out when the moderating effects of industries were investigated.

5.6.2.2 Main effect analysis

As shown in Figure 5-21, the results of meta-analysis revealed that (r= 0.278, 95% CI: 0.197, 0.355, Z-value= 6.484, p < 0.001) organisational learning was positively related to financial performance, which supported $H6_2$.

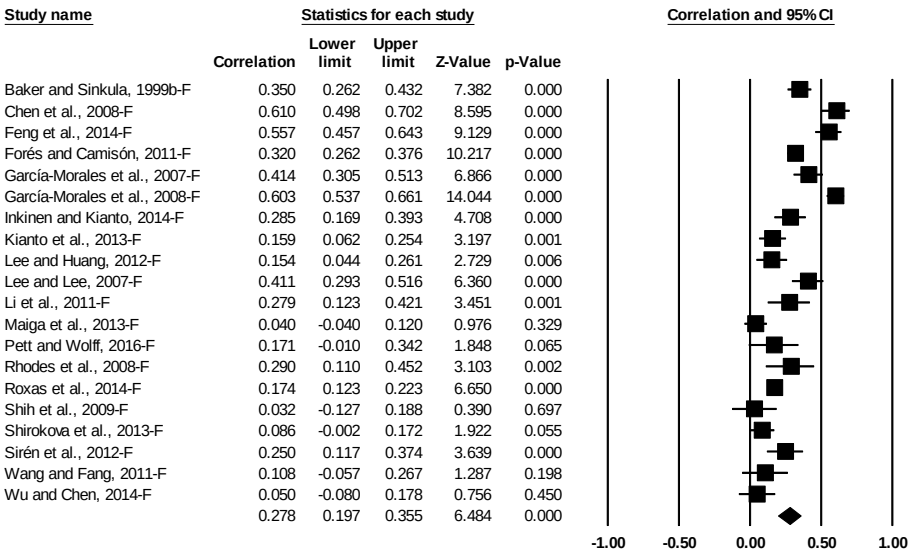


Figure 5-21: Forest plot of the organisational learning-financial performance relationship

5.6.2.3 Publication bias analysis

The classic fail-safe N test (Rosenthal, 1979) implied that the 2,442 (N_2) zero effect sizes which were more than 110 ($5k_2+10= 110$, $k_2= 20$) (Rosenthal, 1979, 1991) needed to obtain an overall insignificant relationship between organisational learning and financial performance. $N_2/(5k_2+10)= 22.200$ was larger than 1 which denotes that the number of the studies is sufficient (Becker, 2005; Mullen *et al*., 2001). Therefore, the 'file-drawer' dilemma was not observed in this study.

5.6.2.4 Homogeneity test

Heterogeneity was revealed in this study because the Q-statistics were significant (Q-statistic= 243.887, p < 0.000, I^2= 92.209>75). I^2 suggested 92.209% of the total

variance in the effect sizes was due to variance between studies. τ^2= 0.035 showed 3.5% variance between studies was used to calculate weights. 92.209% of the total variance in effect sizes could not be interpreted merely by sampling errors. Thus, it is worthy of investigating potential moderators and the reasons for the heterogeneity.

Table 5-40: Homogeneity test of the organisational learning-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
20	243.887	19	0.000	92.209	0.034	0.015	0.019	0.186

5.6.2.5 Moderating effect analysis

Obvious differences of the organisational learning-financial performance relationship were found when effect sizes of long-term orientation and short-term orientation ($Q_{between}$: 2.860; df(Q):1; p-value: 0.091**<0.1) as well as of indulgence-centered culture and restrained culture ($Q_{between}$: 4.259; df(Q):1; p-value: 0.039**<0.05) were compared. This indicated that distinctions of attitudes towards future and entertainment had impacts on the relationship between organisational learning and financial performance. In addition, the integrated effect size was larger in long-term oriented regions than in short-term oriented regions (r_{long}= 0.330*** > r_{short}= 0.203***) while the integrated effect size was larger in restrained regions than in indulgence-oriented regions ($r_{restraint}$= 0.392*** > $r_{indulgence}$= 0.215***) which supported H_{LSf2} and H_{IRf2}. However, differences were not evident in other dimensions of national culture on the organisational learning–financial performance relationship, therefore, H_{PDf2}, H_{ICf2}, H_{FMf2}, and H_{UAf2} were not supported. In addition, the difference of organisational learning-financial performance relationship between developing and developed economies, as well as service and manufacturing industries, were insignificant which did not support H_{Ef2}.and H_{If2}. Empirical results of the moderating effects of the economy and industry can be found in Appendix V.

Table 5-41: Categorical moderator test of national culture (the organisational learning-financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	3	0.320	-0.008	0.586	1.911	0.056	Not supported H_{PDf2}
Power distance (S)	17	0.271	0.184	0.353	5.962	0.000	
Total between	$Q_{between}$: 0.089; df(Q):1; p-value: 0.765						
Collectivism (C)	8	0.309	0.135	0.464	3.420	0.001	Not supported H_{ICf2}
Individualism (I)	12	0.258	0.162	0.350	5.144	0.000	
Total between	$Q_{between}$: 0.265; df(Q):1; p-value: 0.607						
Femininity (F)	13	0.292	0.181	0.395	5.002	0.000	Not supported H_{FMf2}
Masculinity (M)	7	0.252	0.128	0.367	3.931	0.001	
Total between	$Q_{between}$: 0.238; df(Q):1; p-value: 0.625						
Uncertainty avoidance (S)	10	0.310	0.168	0.439	4.163	0.000	Not supported H_{UAf2} [1]
Uncertainty avoidance (W)	9	0.255	0.157	0.348	4.991	0.000	
Total between	$Q_{between}$: 0.411; df(Q):1; p-value: 0.521						
Long-term orientation (L)	12	0.330	0.204	0.445	4.949	0.000	Supported H_{LSf2} [1]
Short-term orientation (S)	7	0.203	0.122	0.281	4.857	0.000	
Total between	$Q_{between}$: 2.860; df(Q):1; p-value: 0.091**<0.1						
Indulgence (I)	12	0.215	0.128	0.297	4.815	0.000	Supported H_{IRf2} [1]
Restrained (R)	7	0.392	0.245	0.522	4.945	0.000	
Total between	$Q_{between}$: 4.259; df(Q):1; p-value: 0.039*<0.1						

Note: [1] The study of Lee and Huang (2012) was excluded.

5.6.3 Organisational learning and non-financial performance

5.6.3.1 Descriptive statistics

Ten studies inspected the relationship between organisational learning and non-financial performance, as shown in Table 5-42. The effect sizes of these studies ranged from 0.03 to 0.858 while the sample sizes varied from 81 to 598, and the total sample size was 2,408. Eight studies were from small power distance regions and two from large power distance regions. Seven studies were in collective societies while three in individualistic societies Similarly, seven studies collected data in feminine regions and three in masculine regions. Three studies were conducted in weak uncertainty avoidance areas and seven studies in strong uncertainty avoidance areas. Respondents were from long-term oriented societies in eight studies and one study in a short-term oriented society [1]. Five studies were in the indulgence-oriented culture group and four

studies in the restrained culture group [1]. Seven studies were from developing economies and three from developed economies. Four studies collected data from the manufacturing industry, two from service industries while three studies were from multiple industries.

Table 5-42: Descriptive statistics (the organisational learning-non-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Huang *et al*., 2010-NF	0.267	170	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
2	Jiménez-Jiménez *et al*., 2014-NF	0.280	81	Spain	S	I	F	S	L	R	Developed	Service
3	Lee and Lee, 2007-NF	0.554	215	Korea	S	C	F	S	L	R	Developing	Multiple
4	Lee *et al*., 2012-NF	0.815	105	Korea	S	C	F	S	L	R	Developing	Multiple
5	Maiga *et al*., 2013-NF	0.256	598	US	S	I	M	W	S	I	Developed	Manufacturing
6	Ngah *et al*., 2016-NF [1]	0.858	255	UAE	L	C	M	S	NA	NA	Developing	Government
7	Salge and Vera, 2013-NF	0.030	459	UK	S	I	M	W	L	I	Developed	Service
8	Shih *et al*., 2009-NF	0.270	155	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
9	Sucahyo *et al*., 2016-NF	0.692	139	Indonesia	L	C	F	W	L	R	Developing	Multiple
10	Wu and Chen, 2014-NF	0.107	231	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing

Note: [1] Ngah *et al*. (2016) sampled population in the UAE where scores of indulgence and long-term orientation are not applicable; therefore, this study was omitted when effects of indulgence and long-term orientation were tested. The study of Ngah *et al*. (2016) was removed because it obtained data in an official department of the UAE; thus, this study was eliminated when the moderating effects of industries were examined.

5.6.3.2 Main effect analysis

From the data in Figure 5-19, it was apparent that organisational learning was positively associated with non-financial performance (r= 0.472, 95% CI: 0.235, 0.655, Z-value= 3.685, p< 0.001), which supported $H6_3$.

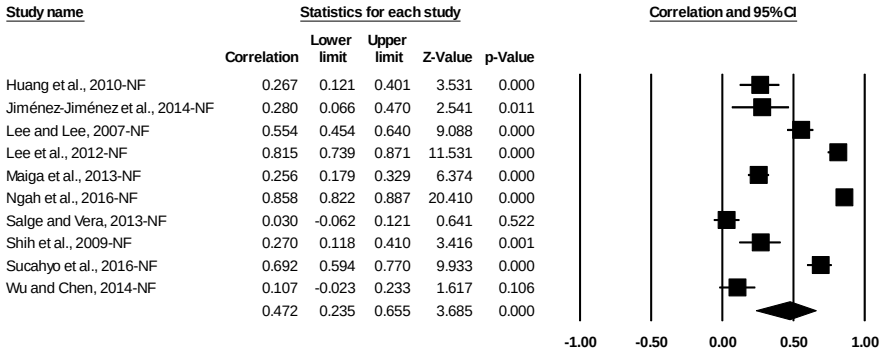


Figure 5-22: Forest plot of the organisational learning-non-financial performance relationship

5.6.3.3 Publication bias analysis

The classic fail-safe N test suggested that if 1,233 (N_3) zero effect sizes were included in the data set, then the organisational learning-non-financial relationship would have been insignificant (Rosenthal, 1979). Furthermore, N_3= 1,233 was well over 60 ($5k_3+10= 60$, $k_3= 10$) (Rosenthal, 1979, 1991) and $N_3/(5k_3+10)= 20.550$ was larger than 1, which implied that the number of the studies was appropriate (Becker, 2005; Mullen *et al.*, 2001) for the meta-analysis. Therefore, publication bias was not evident in this study.

5.6.3.4 Homogeneity test

This study was heterogeneous, based on the Q-statistics (Q-statistic= 390.901, p < 0.000, I^2= 97.698 >75). I^2 denoted 97.698 % of the total variance in the effect sizes because of the variance between studies, which could not be understood by sampling errors only. τ^2= 0.187 meant 18.7 % variance between studies was adopted to calculate the weights.

Consequently, potential moderators and the cause of the heterogeneity need to be examined.

Table 5-43: Homogeneity test of organisational learning-non-financial performance relationship

Sample size	Heterogeneity				Tau-square			
	Q	df(Q)	p	I^2	τ^2	SE	δ^2	τ
10	390.901	9	0.000	97.698	0.187	0.105	0.011	0.433

5.6.3.5 Moderating effect analysis

The categorical moderating effect analysis of national culture, as displayed in Table 5-76, revealed that differences in power distance ($r_{\text{power distance (L)}}$= 0.790*** > $r_{\text{power distance (s)}}$= 0.353***; Q_{between}: 8.570; df(Q):1; p-value: 0.003**<0.01), different degrees of individualism ($r_{\text{collectivism}}$= 0.572*** > $r_{\text{individualism}}$= 0.180***; Q_{between}: 5.275; df(Q):1; p-value: 0.022*<0.1), and different levels of indulgence ($r_{\text{restraint}}$= 0.622*** > $r_{\text{indulgence}}$= 0.182***; Q_{between}: 10.643; df(Q):1; p-value: 0.001**<0.01) had an impact on the relationship between organisational learning and non-financial performance, which rejected H_{PDf3}, supported H_{ICf3} and H_{Irf3}. Comparisons of other dimensions of national culture on the organisational learning-non-financial performance relationship were not evident, which did not support H_{FMf3}, H_{UAf3}, and H_{LSf3}. Additionally, the accumulative effect sizes were significantly distinguished from the economic comparison ($r_{\text{developed}}$= 0.180* < $r_{\text{developing}}$= 0.572***; Q_{between}: 5.275; df(Q):1; p-value: 0.022*<0.1), suggesting that developing economies strengthened the organisational learning-non-financial performance relationship, which rejected H_{Ef3}. Different industrial types did not influence the organisational learning-non-financial performance relationship according to the insignificance of the Q_{between} value, which did not support H_{If3}. Detailed statistical estimations of the moderating effect of industry can be found in Appendix V.

Table 5-44: Categorical moderator test of national culture (the organisational learning-non-financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	2	0.790	0.570	0.905	4.945	0.000	Rejected H_{PDf3}
Power distance (S)	8	0.353	0.165	0.517	3.571	0.000	
Total between	$Q_{between}$: 8.570; df(Q):1; p-value: 0.003**<0.01						
Collectivism (C)	7	0.572	0.286	0.765	3.578	0.000	Supported H_{ICf3}
Individualism (I)	3	0.180	0.002	0.348	1.983	0.047	
Total between	$Q_{between}$: 5.275; df(Q):1; p-value: 0.022*<0.1						
Femininity (F)	7	0.468	0.237	0.648	3.743	0.000	Not supported H_{FMf3}
Masculinity (M)	3	0.481	-0.125	0.825	1.582	0.114	
Total between	$Q_{between}$: 0.002; df(Q):1; p-value: 0.962						
Uncertainty avoidance (S)	7	0.516	0.201	0.735	3.047	0.002	Not supported H_{UAf3}
Uncertainty avoidance (W)	3	0.357	0.010	0.627	2.014	0.044	
Total between	$Q_{between}$: 0.566; df(Q):1; p-value: 0.452						
Long-term orientation (L)	8	0.418	0.185	0.607	3.378	0.001	Not supported H_{LSf3} [1]
Short-term orientation (S)	1	0.256	0.179	0.329	6.374	0.000	
Total between	$Q_{between}$: 1.779; df(Q):1; p-value: 0.182						
Indulgence (I)	5	0.182	0.073	0.287	3.258	0.001	Supported H_{IRf3} [1]
Restrained (R)	4	0.622	0.398	0.777	4.640	0.000	
Total between	$Q_{between}$: 10.643; df(Q):1; p-value: 0.001**<0.01						

Note: [1] The study of Ngah *et al*. (2016) was excluded.

Table 5-45: Categorical moderator test of economies (the organisational learning-non-financial performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	3	0.180	0.002	0.348	1.983	0.047	Rejected H_{Ef3}
Developing economies	7	0.572	0.286	0.765	3.578	0.000	
Total between	$Q_{between}$: 5.275; df(Q):1; p-value: 0.022* <0.1						

5.6.4 Summary of organisational learning-organisational performance relationship meta-analysis

Test results showed that organisational learning was positively related to overall organisational performance (r= 0.454 ,95% CI: 0.341, 0.554, Z-value= 7.150, p < 0.001, which supported $H6_1$), financial performance (r= 0.278, 95% CI: 0.197, 0.355, Z-value= 6.484, p < 0.001,which supported $H6_2$), and non-financial performance (r= 0.472, 95% CI: 0.235, 0.655, Z-value= 3.685, p < 0.001, which supported $H6_3$). Some dimensions of national culture significantly impacted on these relationships. For instance, different degrees of indulgence had an impact on the relationship between organisational learning and organisational performance (overall organisational

performance: $Q_{between}$: 5.823; df(Q):1; p-value: 0.016*<0.1, financial performance: $Q_{between}$: 4.259; df(Q):1; p-value: 0.039*<0.1, and non-financial performance: $Q_{between}$: 10.643; df(Q):1; p-value: 0.001**<0.01) according to categorical moderator test and these relationships were strengthened in restrained culture. Comparisons between long-term orientation culture and short-term orientation culture were also significantly different for the organisational learning-financial performance relationship ($Q_{between}$: 2.860; df(Q):1; p-value: 0.091*<0.1). In addition, different extents of power distance ($Q_{between}$: 8.570; df(Q):1; p-value: 0.003**<0.01) and collectivism ($Q_{between}$: 5.275; df(Q):1; p-value: 0.022*<0.1) did impact the organisational learning-non-financial performance relationship. Surprisingly, the organisational learning-non-financial performance relationship ($Q_{between}$: 18.195; df(Q):2; p-value: 0.000***<0.001) was strengthened in developing economies, rejecting H_{Ef3}. Finally, differences of the effect sizes based on different industries were not obvious in the organisational learning-organisational performance relationships, which did not support H_{If1}, H_{If2}, and H_{If3}. The empirical evidence is summarised in Figure 5-23.

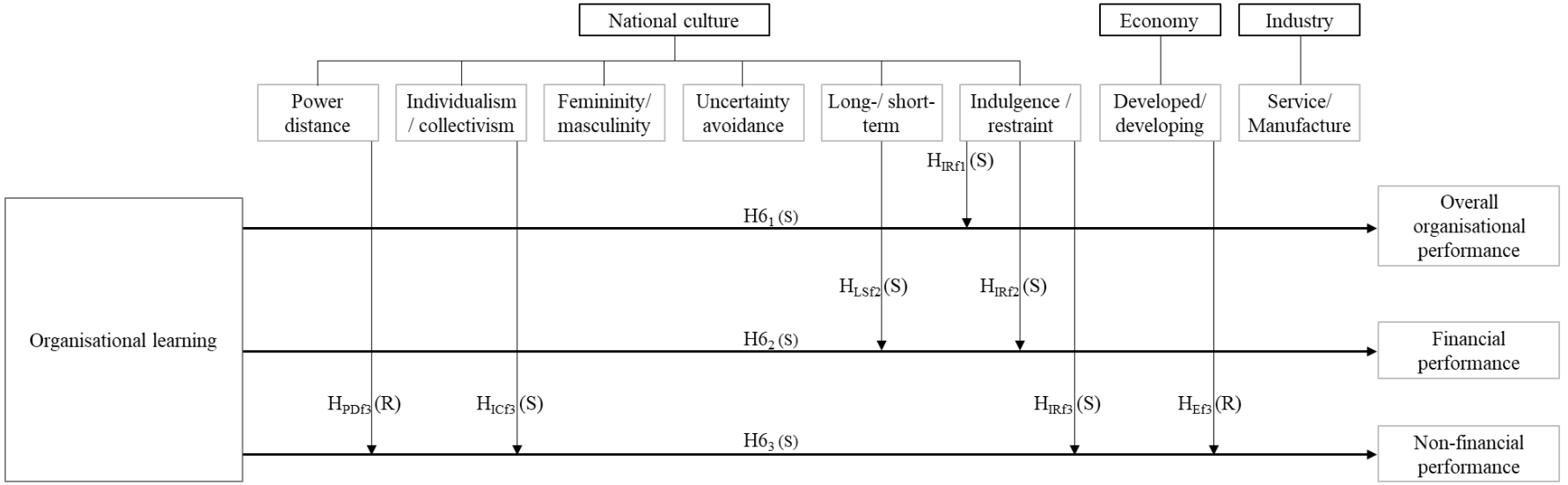


Figure 5-23: Empirical results of organisational learning-organisational performance relationship

5.7 Chapter summary

Firstly, this section shows the empirical results of the main effect analysis, homogeneity test, and publication bias tests for sixteen hypotheses and indicated KM practices were positively related to organisational performance. Table 5-46 demonstrates the positive significant meta-analysis results of the KFOC-organisational performance relationships ($H1_1$: r= 0.438, 95% confidence interval (CI): 0.362, 0.508, Z-value= 10.211, p < 0.001); $H1_2$: r= 0.375, 95% CI: 0.190, 0.533, Z-value= 3.840, p < 0.001; and $H1_3$: r= 0.443, 95% CI: 0.367, 0.513, Z-value= 10.275, p < 0.001), the knowledge-based leadership-organisational performance relationships ($H2_1$: r= 0.420, 95% CI: 0.367, 0.470, Z-value= 13.946, p < 0.001; $H2_2$: r= 0.279, 95% CI: 0.056, 0.475, Z-value= 2.439, p= 0.015 < 0.1; and $H2_3$: r= 0.441, 95% CI: 0.303, 0.561, Z-value= 5.784, p < 0.001), the strategic KM-financial performance relationships ($H3_2$: r= 0.269, 95% CI: 0.149, 0.381, Z-value= 4.309, p < 0.001), the codification strategy-overall organisational performance relationship ($H4_{11}$: r= 0.305, 95% CI: 0.132, 0.460, Z-value= 3.390, p= 0.001 < 0.01), the codification strategy-financial performance relationship ($H4_{12}$: r= 0.274, 95% CI: 0.174, 0.369, Z-value= 5.210, p < 0.001), the personalisation-overall organisational performance relationship ($H4_{21}$= 0.208, 95% CI: 0.036, 0.368, Z-value= 2.362, p= 0.018< 0.1), KM-supportive IT-organisational performance relationships ($H5_1$: r= 0.440, 95% CI: 0.241, 0.604, Z-value= 4.077, p < 0.001; $H5_2$: r= 0.366, 95% CI: 0.240, 0.481, Z-value= 5.403, p < 0.001; and $H5_3$: r= 0.442, 95% CI: 0.349, 0.527, Z-value= 8.442, p < 0.001), and the organisational learning-organisational performance relationships ($H6_1$: r= 0.454, 95% CI: 0.341, 0.554, Z-value= 7.150, p < 0.001; $H6_2$: r= 0.278, 95% CI: 0.197, 0.355, Z-value= 6.484, p < 0.001; and $H6_3$: r= 0.472, 95% CI: 0.235, 0.655, Z-value= 3.685, p < 0.001). All in all,

these findings imply the critical role of KM practices in promoting organisational performance.

Table 5-46: Summary of main effect analysis

SN	Hypothesis	Effect size	95% CI		Z-value	P-value	Conclusion
			LL	UL			
$H1_1$	KFOC → OOP	0.438	0.362	0.508	10.211	0.000	Supported
$H1_2$	KFOC → FP	0.375	0.190	0.533	3.840	0.000	Supported
$H1_3$	KFOC → NFP	0.443	0.367	0.513	10.275	0.000	Supported
$H2_1$	KBL → OOP	0.420	0.367	0.470	13.946	0.000	Supported
$H2_2$	KBL → FP	0.279	0.056	0.475	2.439	0.015	Supported
$H2_3$	KBL → NFP	0.441	0.303	0.561	5.784	0.000	Supported
$H3_1$	SKM → OOP	NA	NA	NA	NA	NA	Not applicable
$H3_2$	SKM → FP	0.269	0.149	0.381	4.309	0.000	Supported
$H3_3$	SKM → NFP	NA	NA	NA	NA	NA	Not applicable
$H4_{11}$	KCS → OOP	0.305	0.132	0.460	3.390	0.000	Supported
$H4_{12}$	KCS → FP	0.274	0.174	0.369	5.210	0.000	Supported
$H4_{13}$	KCS → NFP	NA	NA	NA	NA	NA	Not applicable
$H4_{21}$	KPS → OOP	0.208	0.036	0.368	2.362	0.018	Supported
$H4_{22}$	KPS → FP	NA	NA	NA	NA	NA	Not applicable
$H4_{23}$	KPS → NFP	NA	NA	NA	NA	NA	Not applicable
$H5_1$	KMSIT → OOP	0.440	0.241	0.604	4.077	0.000	Supported
$H5_2$	KMSIT → FP	0.366	0.240	0.481	5.403	0.000	Supported
$H5_3$	KMSIT → NFP	0.442	0.349	0.527	8.442	0.000	Supported
$H6_1$	OL → OOP	0.454	0.341	0.554	7.150	0.000	Supported
$H6_2$	OL → FP	0.278	0.197	0.355	6.484	0.000	Supported
$H6_3$	OL → NFP	0.472	0.235	0.655	3.685	0.000	Supported

Note: KFOC: knowledge-friendly organisational culture; OOP: overall organisational performance, FP: financial performance; NFP: non-financial performance; KBL: knowledge-based leadership; SKM: strategic knowledge management; KCS: knowledge codification strategy; KPS: knowledge personalisation strategy; KMSIT: knowledge management-supportive IT; OL: organisational learning; CI: confidence interval; LI: lower limit; UL: upper limit

Secondly, 126 hypotheses on the moderating effects of national culture on the KM practices-organisational performance relationships were proposed, and 93 of were tested by categorical moderating analysis, as displayed in Table 5-47.

Table 5-47: Moderating test of national culture summary[9]

SN	Studies	Power distance	Individualism v. collectivism	Masculinity v. femininity	Uncertain avoidance	Long-v short-term orientation	Indulgence- v restraint-orientation
1	KFOC-OOP	H_{PDa1}^{ins}: L<S$^{\surd}$	H_{ICa1}^{ins}: I<C$^{\times}$	H_{FMa1}^{ins}: F>M$^{\times}$	H_{UAa1}^{ins}: S<W$^{\surd}$	H_{LSa1}^{ins}: L>S$^{\surd}$	H_{IRa1}^{s}: I>R^{RJ}
2	KFOC-FP	H_{PDa2}^{ins}: L<S$^{\times}$	H_{ICa2}^{ins}: I<C$^{\surd}$	H_{FMa2}^{ins}: F>M$^{\times}$	H_{UAa2}^{ins}: S<W$^{\times}$	H_{LSa2}^{ins}: L>S$^{\surd}$	H_{IRa2}^{ins}: I>R$^{\times}$
3	KFOC-NFP	H_{PDa3}^{ins}: L<S$^{\surd}$	H_{ICa3}^{ins}: I<C$^{\surd}$	H_{FMa3}^{ins}: F>M$^{\times}$	H_{UAa3}^{ins}: S<W$^{\surd}$	H_{LSa3}^{ins}: L>S$^{\surd}$	H_{Ira3}^{s}: I>R$^{\times}$
4	KBL-OOP	H_{PDb1}^{ins}: L<S$^{\times}$	H_{ICb1}^{ins}: I<C$^{\surd}$	H_{FMb1}^{ins}: F>M$^{\surd}$	H_{UAb1}^{ins}: S<W$^{\surd}$	H_{LSb1}^{ins}: L>S$^{\surd}$	H_{IRb1}^{ins}: I>R$^{\times}$
5	KBL-FP	H_{PDb2}^{ins}: L<$S_{ins}^{\surd}$	H_{ICb2}^{ins}: I<C$^{\times}$:	H_{FMb2}^{NA}: F>MU^{UK}	H_{UAb2}^{ins}: S_{ins}<W$^{\times}$	H_{LSb2}^{ins}: L_{ins}>S$^{\surd}$	H_{IRb2}^{ins}: I>$R_{ins}^{\times}$
6	KBL-NFP	H_{PDb3}^{ins}: L<S$^{\times}$	H_{ICb3}^{s}: I<C^{SP}	H_{FMb3}^{ins}: F>M$^{\surd}$	H_{UAb3}^{ins}: S<W$^{\surd}$	H_{LSb3}^{ins}: L>S$^{\surd}$	H_{IRb3}^{ins}: I>R$^{\times}$
7	SKM-OOP	H_{PDc1}^{NA}: L<S^{UK}	H_{ICc1}^{NA}: I<C^{UK}	H_{FMc1}^{NA}: F>M^{UK}	H_{UAc1}^{NA}: S<W^{UK}	H_{LSc1}^{NA}: L>S^{UK}	H_{IRc1}^{NA}: I>R^{UK}
8	SKM-FP	H_{PDc2}^{ins}: L_{ins}<S$^{\times}$	H_{ICc2}^{ins}: I<$C_{ins}^{\times}$	H_{FMc2}^{ins}: F>M$^{\surd}$	H_{UAc2}^{ins}: S_{ins}<W$^{\times}$	H_{LSc2}^{ins}: L_{ins}>S$^{\surd}$	H_{IRc2}^{ins}: I>$R_{ins}^{\times}$
9	SKM-NFP	H_{PDc3}^{NA}: L<S^{UK}	H_{ICc3}^{NA}: I<C^{UK}	H_{FMc3}^{NA}: F>M^{UK}	H_{UAc3}^{NA}: S<W^{UK}	H_{LSc3}^{NA}: L>S^{UK}	H_{IRc3}^{NA}: I>R^{UK}
10	KCS-OOP	H_{PDdc1}^{ins}: L<$S_{ins}^{\times}$	H_{ICdc1}^{ins}: I<C$^{\times}$	H_{FMdc1}^{ins}: F_{ins}>M$^{\times}$	H_{UAdc1}^{ins}: S_{ins}>W$^{\times}$	H_{LSdc1}^{ins}: L>S$^{\times}$	H_{IRdc1}^{s}: I<R^{SP}
11	KCS-FP	H_{PDdc2}^{NA}: L<S^{UK}	H_{ICdc2}^{s}: I<C^{SP}	H_{FMdc2}^{ins}: F>M$^{\surd}$	H_{UAdc2}^{ins}: S>W$^{\surd}$	H_{LSdc2}^{ins}: L>S$^{\surd}$	H_{IRdc2}^{ins}: I<$R_{ins}^{\times}$
12	KCS-NFP	H_{PDdc3}^{NA}: L<S^{UK}	H_{ICdc3}^{NA}: I<C^{UK}	H_{FMdc3}^{NA}: F>M^{UK}	$H_{UAdc3nn}^{NA}$: S>W^{UK}	H_{LSdc3}^{NA}: L>S^{UK}	H_{IRdc3}^{NA}: I<R^{UK}
13	KPS-OOP	H_{PDdp1}^{ins}: L<$S_{ins}^{\times}$	H_{ICdp1}^{ins}: I<$C_{ins}^{\times}$	H_{FMdp1}^{ins}: F_{ins}>$M_{ins}^{\times}$	H_{UAdp1}^{ins}: S_{ins}<W$^{\surd}$	H_{LSdp1}^{NA}: L>S^{UK}	H_{IRdp1}^{ins}: I>$R_{ins}^{\surd}$
14	KPS-FP	H_{PDdp2}^{NA}: L<S^{UK}	H_{ICdp2}^{NA}: I<C^{UK}	H_{FMdp2}^{NA}: F>M^{UK}	H_{UAdp2}^{NA}: S<W^{UK}	H_{LSdp2}^{NA}: L>S^{UK}	H_{IRdp2}^{NA}: I>R^{UK}
15	KPS-NFP	H_{PDdp3}^{NA}: L<S^{UK}	H_{ICdp3}^{NA}: I<C^{UK}	H_{FMdp3}^{NA}: F>M^{UK}	H_{UAdp3}^{NA}:S<W^{UK}	H_{LSdp3}^{NA}: L>S^{UK}	H_{IRdp3}^{NA}: I>R^{UK}
16	KMIT-OOP	H_{PDe1}^{ins}: L<S$^{\times}$	H_{ICe1}^{ins}: I>C$^{\times}$	H_{FMe1}^{ins}: F>M$^{\times}$	H_{UAe1}^{ins}: S>W$^{\surd}$	H_{LSe1}^{ins}: L>$S_{ins}^{\times}$	H_{IRe1}^{ins}: I>R$^{\surd}$
17	KMIT-FP	H_{Pde2}^{ins}: L<S$^{\times}$	H_{Ice2}^{ins}: I>C$^{\times}$	H_{FMe2}^{ins}: F>M$^{\times}$	H_{UAe2}^{ins}: S>W$^{\surd}$	H_{LSe2}^{ins}: L>S$^{\surd}$	H_{IRe2}^{ins}: I>R$^{\surd}$
18	KMIT-NFP	H_{Pde3}^{ins}: L<S$^{\surd}$	H_{Ice3}^{ins}: I>C$^{\times}$	H_{FMe3}^{ins}: F>M$^{\times}$	H_{UAe3}^{ins}: S>W$^{\surd}$	H_{LSe3}^{ins}: L>S$^{\surd}$	H_{IRe3}^{ins}: I>R$^{\times}$
19	OL-OOP	H_{PDf1}^{ins}: L<S$^{\times}$	H_{ICf1}^{ins}: I<C$^{\times}$	H_{FMf1}^{ins}: F>M$^{\times}$	H_{UAf1}^{ins}: S<W$^{\surd}$	H_{LSf1}^{ins}: L>S$^{\times}$	H_{IRf1}^{s}: I<R^{SP}
20	OL-FP	H_{PDf2}^{ins}: L_{ins}<S$^{\times}$	H_{ICf2}^{ins}: I<C$^{\surd}$	H_{FMf2}^{ins}: F>M$^{\surd}$	H_{UAf2}^{ins}: S<W$^{\times}$	H_{LSf2}^{s}: L>S^{SP}	H_{IRf2}^{s}: I<R^{SP}
21	OL-NFP	H_{PDf3}^{s}: L<S^{RJ}	H_{ICf3}^{s}: I<C^{SP}	H_{FMf3}^{ins}: F>$M_{ins}^{\times}$	H_{UAf3}^{ins}: S<W$^{\times}$	H_{LSf3}^{ins}: L>S$^{\surd}$	H_{IRf3}^{s}: I<R^{SP}

Note: ^{s} denotes the comparison between two groups was significantly different; ^{SP} denotes the hypothesis was supported; ^{RJ} denotes the hypothesis was rejected; ^{NA} denotes the hypothesis was not tested due to lacked data; ^{ins} denote the comparison between two groups was insignificant; $_{ins}$ denotes the overall effect size of the group was insignificant; ^{UK} denotes the moderating effect of the moderator remains unknown due to lacked data; $^{\surd}$denotes the empirical result complied with the hypothesis, but the group comparison was insignificant, which could not support the hypothesis;$^{\times}$denotes the empirical result did not comply with the hypothesis and the group comparison was insignificant, which could not reject the hypothesis.

[9] Among 126 hypotheses concerning national culture on the KM practices-organisational performance relationships, 33 hypotheses were not tested due to lacked data. 45 hypotheses complied with the hypotheses, but only eight of them were significant in terms of categorical comparison. 48 hypotheses did not comply with the hypotheses and two of them were significant in terms of categorical comparison,

Among the tested 93 hypotheses, ten comparisons of the categorical moderator test were significant. The KFOC-overall organisational performance relationship was affected by the different degrees of the indulgence-oriented culture ($Q_{between}$:5.590; df(Q):1; p-value: 0.018*< 0.1), which rejected H_{IRa1} ($r_{indulgence}$ = 0.330*** < $r_{restraint}$ = 0.504***). In addition, national culture affected the knowledge-based leadership-non-financial performance relationship because of the different extents of individualism ($Q_{between}$: 13.563; df(Q):1; p-value: 0.000***< 0.001), which supported H_{ICb3} ($r_{individualism}$= 0.253***< $r_{collectivism}$= 0.554***). Different degrees of indulgence also ($Q_{between}$: 28.538; df(Q):1; p-value: 0.000***<0.001) had an impact on the knowledge codification strategy-overall organisational performance relationship, which supported H_{IRdc1}. Differences between individualism and collectivism ($Q_{between}$: 3.568; df(Q):1; p-value: 0.059*<0.1) of national culture influenced the bearing between the knowledge codification strategy and financial performance, which supported H_{ICdc2} ($r_{individualism}$= 0.183**< $r_{collectivism}$= 0.332***). Notable differences between indulgence-oriented culture and restraint-oriented culture were observed in affecting the organisational learning-overall organisational performance relationship ($Q_{between}$: 5.823; df(Q):1; p-value: 0.016*<0.1), the organisational learning-financial performance relationship ($Q_{between}$: 4.259; df(Q):1; p-value: 0.039*<0.1), and the organisational learning-non-financial performance relationship ($Q_{between}$: 10.643; df(Q):1; p-value: 0.001**<0.01), which supported H_{IRf1} ($r_{indulgence}$= 0.281*** < $r_{restraint}$= 0.504***), H_{IRf2}, ($r_{indulgence}$= 0.215*** < $r_{restraint}$= 0.392***), and H_{IRf3} ($r_{indulgence}$= 0.182** < $r_{restraint}$= 0.622***). Differences between long-term orientation culture and short-term orientation culture ($Q_{between}$: 2.860; df(Q):1; p-value: 0.091**<0.1) had an impact on the organisational learning-financial performance relationship. Different degrees of power distance ($Q_{between}$: 8.570; df(Q):1; p-value: 0.003**<0.01) moderated the organisational

learning-non-financial performance relationship by strengthening the effect size in large power distance regions ($r_{power\ distance\ (S)}$= 0.353*** < $r_{power\ distance\ (L)}$= 0.790***), which rejected H_{PDf3}. In addition, differences between individualism and collectivism ($Q_{between}$: 5.275; df(Q):1; p-value: 0.022*<0.1) affected the relation between organisational learning and non-financial performance, which supported H_{ICf3} ($r_{individualism}$= 0.180*** < $r_{collectivism}$ = 0.572***). These results support the idea that national culture is a factor that influences KM and its benefits. A summary of these findings are listed in Table 5-48.

Table 5-48: Summary of significant moderating effect analysis (national culture)

SN	Hypothesis	Empirical result	Conclusion
H_{IRa1}	Indulgence/restraint ↓ KFOC →OOP	$r_{indulgence}$= 0.330*** < $r_{restraint}$= 0.504***	Rejected
		$Q_{between}$:5.590; df(Q):1; p-value: 0.018*< 0.1	
H_{ICb3}	Individualism/collectivism ↓ KBL → NFP	$r_{individualism}$= 0.253***< $r_{collectivism}$= 0.554***	Supported
		$Q_{between}$: 13.563; df(Q):1; p-value: 0.000***< 0.001	
H_{IRdc1}	Indulgence/restraint ↓ KCS → OOP	$r_{indulgence}$= -0.190*< $r_{restraint}$= 0.382***	Supported
		$Q_{between}$: 28.538; df(Q):1; p-value: 0.000***<0.001	
H_{ICdc2}	Individualism/collectivism ↓ KCS → FP	$r_{individualism}$= 0.183**< $r_{collectivism}$= 0.332***	Supported
		$Q_{between}$: 3.568; df(Q):1; p-value: 0.059*< 0.1	
H_{IRf1}	Indulgence/restraint ↓ OL → OOP	$r_{indulgence}$= 0.281***< $r_{restraint}$= 0.504***	Supported
		$Q_{between}$: 5.823; df(Q):1; p-value: 0.016*< 0.1	
H_{LSf2}	Short-term /long-term ↓ OL → FP	$r_{short\text{-}term}$= 0.203*** <$r_{long\text{-}term}$= 0.330***	Supported
		$Q_{between}$: 2.860; df(Q):1; p-value: 0.091**< 0.1	
H_{IRf2}	Indulgence/restraint ↓ OL → FP	$r_{indulgence}$= 0.215***< $r_{restraint}$= 0.392***	Supported
		$Q_{between}$: 4.259; df(Q):1; p-value: 0.039*< 0.1	
H_{PDf3}	Power distance ↓ OL → NFP	$r_{power\ distance\ (S)}$= 0.353*** < $r_{power\ distance\ (L)}$= 0.790***	Rejected
		$Q_{between}$: 8.570; df(Q):1; p-value: 0.003**< 0.01	
H_{ICf3}	Individualism/collectivism ↓ OL → NFP	$r_{individualism}$= 0.180*** < $r_{collectivism}$= 0.572***	Supported
		$Q_{between}$: 5.275; df(Q):1; p-value: 0.022*< 0.1	
H_{IRf3}	Indulgence/restraint ↓ OL → NFP	$r_{indulgence}$= 0.182**< $r_{restraint}$= 0.622***	Supported
		$Q_{between}$: 10.643; df(Q):1; p-value: 0.001**< 0.01	

Thirdly, twenty-one hypotheses about the moderating effects of the national economy on the KM practices-organisational performance were proposed and fifteen were tested, but only three were statistically significant, as presented in Table 5-49. H_{Eb3} was

rejected as distinct differences between developing economies and developed economies were found on impacting the knowledge-based leadership-non-financial performance relationship ($Q_{between}$: 15.617; df(Q):1; p-value: 0.000***<0.001), and this relationship was strengthened in developing economies. Additionally, the moderating effects of economies were obvious for the KM-supportive IT-financial performance relationship ($Q_{between}$: 3.726; df(Q):1; p-value: 0.054*<0.1), but this relationship was stronger ($r_{developed}$= 0.224***< $r_{developing}$= 0.442***) in developing economies, which rejected H_{Ee2}. Significant differences of economies were also found on influencing the organisational learning-non-financial performance relationship ($Q_{between}$: 5.275; df(Q):1; p-value: 0.022* <0.1) and this relationship was strengthened in developing economies as well ($r_{developed}$= 0.180*< $r_{developing}$= 0.572***), therefore H_{Ef3} was rejected. Such findings provide insights for considering the impacts of national economies on KM implementation and its outcomes. Table 5-50 shows details of significant empirical results on the moderating effects of national economies.

Table 5-49: Moderating test of national economy summary

SN		Economy	SN		Economy
1	KFOC-OOP	H_{Ea1}^{ins}: Dd>Di$^{\times}$	13	KPS-OOP	H_{Edp1}^{NA}: Dd>Di^{UK}
2	KFOC-FP	H_{Ea2}^{ins}: Dd>Di$^{\times}$	14	KPS-FP	H_{Edp2}^{NA}: Dd>Di^{UK}
3	KFOC-NFP	H_{Ea3}^{ins}: Dd>Di$^{\times}$	15	KPS-NFP	H_{Edp3}^{NA}: Dd>Di^{UK}
4	KBL-OOP	H_{Eb1}^{ins}: Dd>Di$^{\times}$	16	KMIT-OOP	H_{Ee1}^{ins}: Dd>Di$^{\times}$
5	KBL-FP	H_{Edp2}^{ins}: Dd>Di$^{\surd}$	17	KMIT-FP	H_{Ee2}^{s}: Dd>Di^{RJ}
6	KBL-NFP	H_{Eb3}^{s}: Dd>Di^{RJ}	18	KMIT-NFP	H_{Ee3}^{ins}: Dd>Di$^{\times}$
7	SKM-OOP	H_{Ec1}^{NA}: Dd>Di^{UK}	19	OL-OOP	H_{Ef1}^{ins}: Dd>Di$^{\times}$
8	SKM-FP	H_{Ec2}^{ins}: Dd>$Di_{ins}^{\surd}$	20	OL-FP	H_{Ef2}^{ins}: Dd>Di$^{\times}$
9	SKM-NFP	H_{Ec3}^{NA}: Dd>Di^{UK}	21	OL-NFP	H_{Ef3}^{s}: Dd>Di^{RJ}
10	KCS-OOP	H_{Edc1}^{NA}: Dd>Di^{UK}			
11	KCS-FP	H_{Edc2}^{NA}: Dd_{ins}>Di$^{\times}$			
12	KCS-NFP	H_{Edc3}^{NA}: Dd>Di^{UK}			

Note: Dd denotes developed economies; Di denotes developing economies; ^{s} denotes the comparison between two groups was significantly different; ^{SP} denotes the hypothesis was supported; ^{RJ} denotes the hypothesis was rejected; ^{NA} denotes the hypothesis was not tested due to lacked data; ^{ins} denote the comparison between two groups was insignificant; $_{ins}$ denotes the overall effect size of the group was insignificant; ^{UK} denotes the moderating effect of the moderator remains unknown due to lacked data; $^{\surd}$denotes the empirical result complied with the hypothesis, but the group comparison was insignificant,

which could not support the hypothesis;ˣdenotes the empirical result did not comply with the hypothesis and the group comparison was insignificant, which could not reject the hypothesis.

Table 5-50: Summary of significant moderating effect analysis (national economy)

SN	Hypothesis	Empirical result	Result
H_{Eb3}	Economy ↓ KBL → NFP	$r_{developed}$= 0.203***< $r_{developing}$= 0.530***	Rejected
		$Q_{between}$: 15.617; df(Q):1; p-value: 0.000***<0.001	
H_{Ee2}	Economy ↓ KMSIT → FP	$r_{developed}$= 0.224***< $r_{developing}$= 0.442***	Rejected
		$Q_{between}$: 3.726; df(Q):1; p-value: 0.054*<0.1	
H_{Ef3}	Economy ↓ OL → NFP	$r_{developed}$= 0.180*< $r_{developing}$= 0.572***	Rejected
		$Q_{between}$: 5.275; df(Q):1; p-value: 0.022* <0.1	

Finally, twenty-one hypotheses regarding the moderating effects of industries on the KM practices-organisational performance relationships were formulated and fifteen were examined, but only three comparisons between the service and manufacturing industries were significantly different, as set out in Table 5-51. Major differences between the service and manufacturing industries were shown in the KFOC-overall organisational performance relationship ($Q_{between}$: 5.861; df(Q):1; p-value: 0.015*<0.05), which supported H_{Ia2}. Conversely, the difference between service and manufacturing industries was significant in affecting the relationship between knowledge-based leadership and non-financial performance ($Q_{between}$: 9.957; df(Q):1; p-value: 0.002**<0.01), but this relationship was stronger in the manufacturing industry ($r_{service}$ = 0.203** < $r_{manufacturing}$= 0.582***), which rejected H_{Ib3}. Similarly, significant differences of industries were revealed on impacting the strategic KM-financial performance relationship ($Q_{between}$: 8.337; df(Q):1; p-value: 0.015*<0.1 but this relationship was strengthened in the manufacturing industry ($r_{service}$= 0.237***< $r_{manufacturing}$= 0.535***), which rejected H_{Ic2}. A summary of the significant moderating effects of industries is displayed in Table 5-52.

Table 5-51: Moderating test of industries summary

SN		Industry	SN		Industry
1	KFOC-OOP	H_{Ia1}^{ins}: S>M$^{\surd}$	13	KPS-OOP	H_{Idp1}^{ins}: S>M$^{\surd}$
2	KFOC-FP	H_{Ia2}^{s}: S>M^{SP}	14	KPS-FP	H_{Idp2}^{NA}: S>M^{UK}
3	KFOC-NFP	H_{Ia3}^{ins}: S>M$^{\times}$	15	KPS-NFP	H_{Idp3}^{NA}: S>M^{UK}
4	KBL-OOP	H_{Ib1}^{ins}: S>M$^{\times}$	16	KMIT-OOP	H_{Ie1}^{ins}: S>M$^{\surd}$
5	KBL-FP	H_{Ib2}^{NA}: S>M^{UK}	17	KMIT-FP	H_{Ie2}^{ins}: S>M$^{\times}$
6	KBL-NFP	H_{Ib3}^{s}: S>M^{RJ}	18	KMIT-NFP	H_{Ie3}^{ins}: S>M$^{\times}$
7	SKM-OOP	H_{Ic1}^{NA}: S>M^{UK}	19	OL-OOP	H_{If1}^{ins}: S>M$^{\times}$
8	SKM-FP	H_{Ic2}^{s}: S>M$^{\times RJ}$	20	OL-FP	H_{If2}^{ins}: S_{ins}>M$^{\times}$
9	SKM-NFP	H_{Ic3}^{NA}: S>M^{UK}	21	OL-NFP	H_{If3}^{ins}: S_{ins}>M$^{\times}$
10	KCS-OOP	H_{Idc1}^{ins}: S<$M_{ins}^{\times}$			
11	KCS-FP	H_{Idc2}^{ins}: S<M$^{\surd}$			
12	KCS-NFP	H_{Idc3}^{NA}: S<M^{UK}			

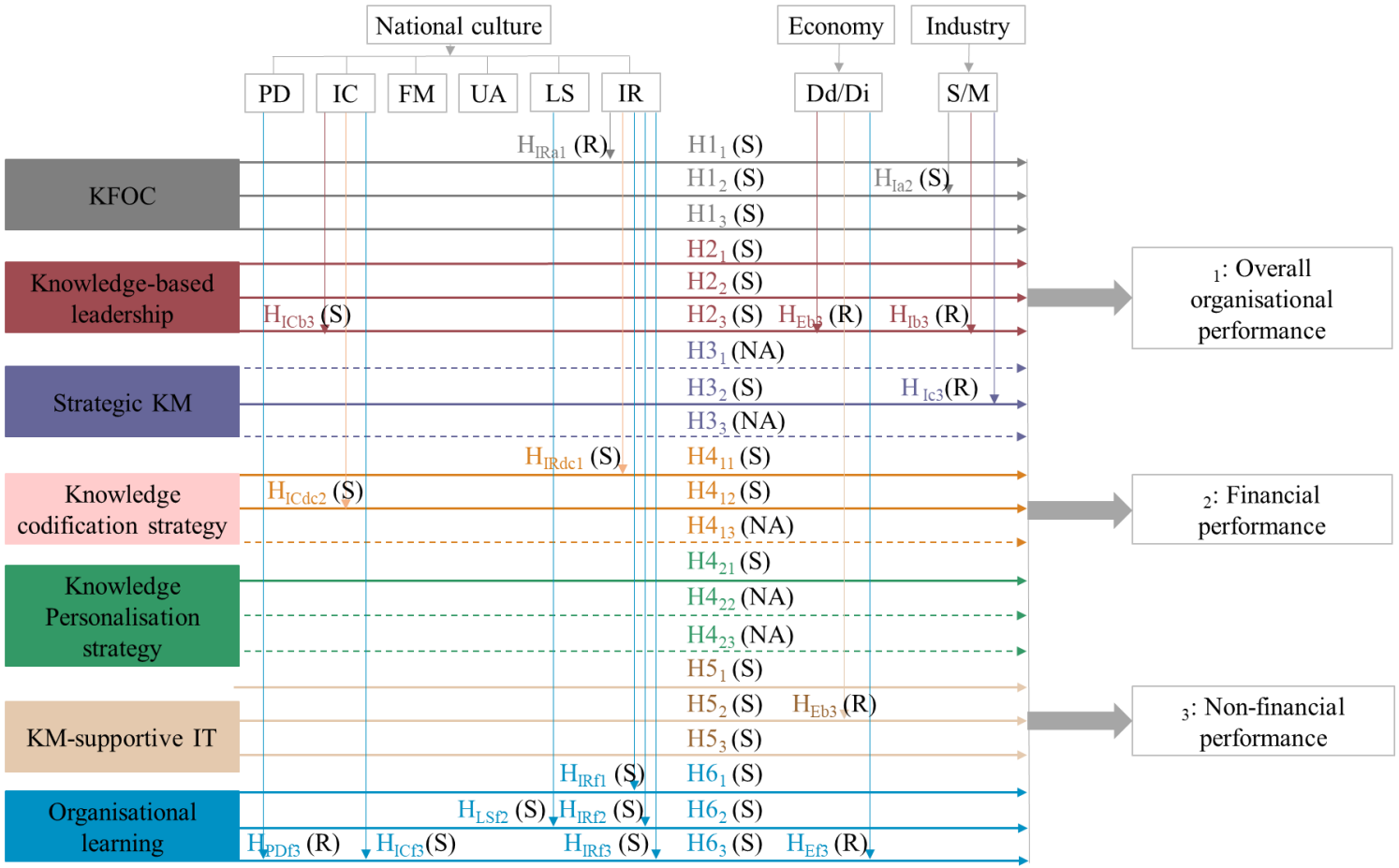
Note: S denotes service industries; M denotes manufacturing industry; ^{s} denotes the comparison between two groups was significantly different; ^{SP} denotes the hypothesis was supported; ^{RJ} denotes the hypothesis was rejected; ^{NA} denotes the hypothesis was not tested due to lacked data; ^{ins} denote the comparison between two groups was insignificant; $_{ins}$ denotes the overall effect size of the group was insignificant; ^{UK} denotes the moderating effect of the moderator remains unknown due to lacked data; $^{\surd}$denotes the empirical result complied with the hypothesis, but the group comparison was insignificant, which could not support the hypothesis;$^{\times}$denotes the empirical result did not comply with the hypothesis and the group comparison was insignificant, which could not reject the hypothesis.

Table 5-52: Summary of significant moderating effect analysis (industry)

SN	Hypothesis	Empirical result	Result
H_{Ia2}	Industry ↓ KFOC → FP	$r_{manufacturing}$= 0.334**< $r_{service}$= 0.590***	Supported
		$Q_{between}$: 5.861; df(Q):1; p-value: 0.015*<0.05	
H_{Ib3}	Industry ↓ KBL → NFP	$r_{service}$= 0.203** < $r_{manufacturing}$= 0.582***	Rejected
		$Q_{between}$: 9.957; df(Q):1; p-value: 0.002**<0.01	
H_{Ic2}	Industry ↓ SKM → FP	$r_{service}$= 0.237***< $r_{manufacturing}$= 0.535***	Rejected
		$Q_{between}$: 8.337; df(Q):1; p-value: 0.015*<0.1	

All the significant relationships are displayed in Figure 5-24.

A detailed discussion of the main findings, theoretical contributions, managerial recommendations, and the key issues which have arisen from these empirical results is provided in the next chapter.



Note: PD: power distance; IC: individualism versus collectivism; FM: masculinity versus femininity; UA: uncertainty avoidance; LS: long-versus short-term orientation; IR: indulgence- versus restraint- orientation; Dd: developed economy; Di: developing economy; S: service industries; M: manufacturing industry; (S): supported; (R): Rejected; (NA): not applicable

Figure 5-24: Summary of significant empirical results

Chapter 6 Discussion and conclusions

The final chapter is divided into six main sections. The first section summarises the findings which emerged from the statistical analyses presented in the previous chapter. Evaluation, explanations, and contributions of the findings are discussed in the second section. The theoretical significance and practical contributions of this study are presented. The limitations of this study and recommendations for future research are followed.

6.1 Summary of the findings

Previous studies assessing KM practices-organisational performance relationships showed inconsistent results, however, this study revealed encouraging findings on the relationships between KM practices and organisational performance, as well as the moderating effects of contextual factors on these relationships. The findings clearly showed that (1) KFOC and (2) knowledge-based leadership were positively related to overall organisational performance, financial performance, and non-financial performance while (3) strategic KM was positively associated with financial performance. It convincingly demonstrated that (4) the knowledge codification strategy was positively related to the overall organisational performance as well as the financial performance, while the knowledge personalisation strategy was positively related to overall organisational performance. It also reconfirmed (5) KM-supportive IT and (6) organisational learning were positively associated with overall organisational performance, financial performance, and non-financial performance.

Second, despite the impacts of national culture on the KM practices-organisational performance relationships being complex, some valuable knowledge about the effect of

national culture on KM practices-organisational relationships was revealed. It was found that the relationship between organisational learning and non-financial performance was strengthened in large power distance societies. In addition, it suggested that the relationship between knowledge-based leadership and non-financial performance, the relationship between knowledge codification strategy and financial performance relationship, and the relationship between organisational learning and non-financial performance were strengthened in collective societies. It was also revealed that the relationship between organisational learning and non-financial performance was stronger in long-term oriented cultures than in short-term oriented cultures. Perhaps the most compelling finding was the impact of indulgence-orientation on the KM practices-organisational performance, which showed that the KFOC-overall organisational performance relationship, the knowledge codification strategy-overall organisational performance relationship, the organisational learning-overall organisational performance relationship, the organisational learning-financial performance relationship, and the organisational learning-non-financial performance relationship were mitigated in higher indulgence-oriented cultures.

In general, the findings concerning the moderating effect of the national economy on the KM practices-organisational performance relationship were striking because most comprehensive effect sizes of the KM practices-organisational performance relationships were stronger in developing economies than in developed economies though not all the group comparisons were significant. However, the categorical comparisons between developing and developed economies for the knowledge-based leadership-non-financial performance relationship, the KM-supportive IT-financial performance relationship, and the organisational learning-non-financial performance

relationship were significantly different, which suggested that these relationships were strengthened in developing economies rather than in developed economies.

Finally, unexpected evidence, as presented in Table 5-51, indicated KM practices-organisational performance relationships were not always strengthened in service industries as the moderating effects of industries were mixed. For instance, the KFOC-financial performance relationship was stronger in service industries than in the manufacturing industry. Conversely, the knowledge-based leadership-non-financial performance relationship and the strategic KM-financial performance relationship were stronger in the manufacturing industry.

6.2 Discussion and implications

As listed in the introduction, there are six groups of questions with respect to the relationships between KM practices (e.g., KFOC, knowledge-based leadership, knowledge codification and personalisation strategy, strategic KM, KM-supportive IT, and organisational learning) and organisational performance (e.g., overall organisational performance, financial performance, and non-financial performance) as well as the moderating effects of contextual factors: national culture, economy, and industry. Discussion of the synthesis and evaluation of these relationships, based on the empirical findings for each group of research questions, is given in the following sub-sections

6.2.1 Research question group I: KFOC related

- *Research question 1.1: To what extent the KFOC is related to organisational performance*

The KFOC can help an organisation to improve its performance because an organisation can create, acquire, and apply knowledge more effectively and efficiently in a KFOC. This study supported this argument by showing a significant accumulative effect size ($r_{KFOC\text{-}OOP}$= 0.438), confirming that KFOC was positively related to overall organisational performance. The finding is in line with a great number of the previous studies, such as Wong and Wong (2011), Baker and Sinkula (1999b), Kamhawi (2012) and the like, supporting $H1_1$. In addition, the finding also accords with earlier studies (e.g. Kianto *et al*. (2013), Collins and Smith (2006), and Hsu and Sabherwal (2012)) which argue that KFOC is positively related to the financial performance of firms. Hypothesis $H1_2$ was supported by demonstrating a significant overall effect size ($r_{KFOC\text{-}FP}$= 0.375). Finally, it is clear from this study that KFOC was positively associated with the non-financial performance of organisations ($r_{KFOC\text{-}NFP}$= 0.443), which corroborates with the findings of prior research, for instance, Tan and Wong (2015), Sucahyo *et al*. (2016) and Chuang *et al*. (2013), supporting hypothesis $H1_3$.

The above-mentioned positive findings on the relationships between KFOC and organisational performance can be explained by the fact that if the organisational culture is more friendly towards knowledge, the organisations can manage their knowledge more successfully (Davenport *et al*., 1998; Mousavizade and Shakibazad, 2019). Affected by a KFOC, employees understand the knowledge is important and believe KM is beneficial for their job. Positive behaviour toward knowledge is common in organisations with KFOC, for instance, employees trust and share their knowledge to help each other; the employees are also open to experiment and create knowledge for innovation; the employees smoothly collaborate to solve problems; the employees are also willing to learn to improve their skills. In this way, employees can get the latest knowledge that they need to improve their performance while organisations can benefit

from the employees' efforts on KM activities so as to increase their competitive advantages over their rivals.

To the best of the author's knowledge, this study is the first one that has presented evidence for the KFOC-organisational performance relationships via a meta-analysis method. The answer to research question 1.1 firstly helps to clarify the contradictory relationship between KFOC and organisational performance based on a great number of research subjects across many empirical studies (9,515 subjects from thirty studies for the KFOC-overall organisational performance relationship, 2,851 subjects from thirteen studies for the KFOC- financial performance relationship, and 4,190 subjects from twenty-three studies for the KFOC-non-financial performance relationship), which expands the studies of Inkinen (2016) and Gupta and Chopra (2018) by offering a specific comprehensive magnitude between the KFOC and overall organisational performance, the KFOC and financial performance, the KFOC and non-financial performance. Therefore, generalisability regarding the impacts of KFOC on the organisational performance is remarkably improved based on such a large number of studies. Secondly, this study deepens our understanding of the knowledge-based view by proving that KFOC can help organisations to realise competitive advantages through creating a widely accepted belief among employees that embracing positive knowledge-related behaviour can enhance the efficiency of knowledge flows in organisations.

This study also has several practical applications. Firstly, it offers KM practitioners direct empirical evidence that reveals the relationship between KFOC and its benefits, which helps knowledge managers to promote KFOC in their organisations; secondly, some practices should be adopted to create a set of shared values and beliefs which enable employees to be passionate about learning, open to innovation, trusting,

collaborative, and in sharing knowledge to each other. For instance, organising communities of practice, sharing knowledge during meetings, motivating learning and training by examinations, fostering trust by team-working, and a high tolerance for the unexpected results of innovative ideas.

- *Research question 2.1.1: Does national culture moderate the KFOC-organisational performance relationships?*

The impacts of national culture on the KFOC-organisational performance relationship are complex as not all comparisons of different dimensions of national culture are significant and some comparisons are controversial. For instance, the overall effect size in large power distance societies was smaller for the KFOC-overall organisational performance relationship and the KFOC-non-financial performance relationship, whereas the overall effect size was larger for the KFOC-financial performance relationship in smaller power distance regions. In addition, it was found that the overall effect size was larger in collective societies for the KFOC-financial performance relationship and the KFOC-non-financial performance relationship, but the result was contradictory for the KFOC-overall organisational performance relationship which had a larger overall effect size in individualistic societies. Contradictions were also revealed for the dimension of uncertainty avoidance. The overall effect size was larger in weak uncertainty avoidance societies for the KFOC-overall organisational performance relationship and KFOC-non-financial performance relationship, while a larger effect size was found in strong uncertainty avoidance for the KFOC-financial performance relationship. On the other hand, the overall effect size was larger between KFOC and all three types of organisational performance in masculine societies than in feminine societies, as well as in long-term oriented cultures than in short-term oriented cultures.

Taken together, different degrees of power distance, individualism, masculinity, uncertainty avoidance, long-term orientation did not have statistically different impacts on the KFOC-organisational performance relationship despite the effect sizes being different. It indicates that these dimensions of national culture were not sensitive in affecting KFOC and its outcome.

On the other hand, different degrees of indulgence significantly impacted on the relationship between KFOC and overall organisational performance, rejecting H_{IRa1} because the overall effect size in a restrained culture was larger than in an indulgence-oriented culture ($r_{indulgence}$= 0.330*** < $r_{restrained}$= 0.504***). This contradictory finding can be explained by the following factors. People in a restrained culture generally feel helpless in their life (Hofstede *et al*., 2010), but the KFOC emphasises on building trust and collaborative culture to share knowledge so that helplessness emotion of employees could be mitigated. This explains the reason that the effect size in restrained culture was stronger. In other words, KFOC is more effective to enhance overall organisational performance once it is formulated in a restrained culture. This conclusion is also applicable for the relationship between KFOC and financial as well non-financial performance, but the distinctions were not statistically obvious when compared by indulgence oriented and restrained cultures for other two types of organisational performance.

This study has also shed light into improving our knowledge of the impact of national culture on the relationship between KFOC and organisational performance, which extends KM theory by considering the impacts of cross-cultural factors and contributes to international business research through adding a comprehensive study on KFOC-organisational performance connections in the field. Surprisingly, it has revealed that a restrained culture rather than an indulgence-oriented culture may strengthen the KFOC

and its benefits, whilst differences in other dimensions of national culture almost equally affected the KFOC-organisational performance relationship.

This finding suggests that KM practitioners should pay attention to the impacts of national culture when they initiate KM projects. It is necessary to find an appropriate way to align KM with the cultural background of the nation, especially for multi-national companies. For instance, managers might encourage continuous learning without extra remuneration in a restrained culture as people more likely to learn by themselves, but managers are highly recommended in an indulgence-oriented culture to encourage employees to learn with a bonus, because they are unlikely to learn by themselves without motivation.

- *Research question 2.2.1: Does national economy moderate the KFOC-organisational performance relationships?*

Comparisons between developed and developing economies on the KFOC-organisational performance relationships were not statistically significant, which did not support H_{Ea1}, H_{Ea2}, and H_{Ea3}. Despite the insignificant group comparisons, it was revealed that the effect sizes were larger in developing economies than in developed economies, which was contradictory to the hypotheses. This might be explained by the fact that KM in firms from developed economies is more mature than firms from developing economies in general. However, the impact of KM on organisational performance would be stronger in developing economies if KM maturity in both developing and developed economies was at the same level. It implies that it needs more sophisticated KM tools and technologies are needed to obtain KM-related benefits in developed economies, whereas firms in developing economies need to improve KM to be at the same level as in the developed economies so as to obtain more competitive

advantages than their competitors. This finding also reflects that there is still potential for firms in developing economies to grow.

It is difficult to confirm the moderating effects of national economies on the KFOC-organisational performance relationship based on the insignificant group comparisons, but it helps others to better understand that differences in KFOC-organisational performance relationships exist between different economic situations. Knowledge managers should take advantage of this contextual factor to figure out an effective solution to manage organisational knowledge. Generally, knowledge managers in developed economies should consider more advanced methods to manage knowledge, while knowledge managers in developing economies should benchmark their KM projects with their competitors in developed economies to sustain competitive advantages over their local rivals.

- *Research question 2.3.1: Does the type of industry moderate the KFOC-organisational performance relationships?*

In line with Kianto and Andreeva (2014), this study found the KFOC-financial performance relationship was strengthened in service industries ($r_{manufacturing}$= 0.334**< $r_{service}$= 0.590***), which can be explained by the fact that service industries are more knowledge-intensive than manufacturing industry (Kianto and Andreeva, 2014). Once formulating a mature KFOC, firms in service industries are more able to obtain better financial performance than in manufacturing industry because it is more important for firms in service industries to have a culture where employees can easily share, obtain, and apply knowledge. A similar conclusion was found for the KFOC-overall organisational performance relationship, though the comparisons were not significant. However, the comparison of industries for the relationship between KFOC and non-

financial performance was insignificant, but the integrated effect size was larger in the manufacturing industry than in the service industries. This inconsistency may be due to the heterogeneity of the service industries as some service industries are not more knowledge-intensive than the manufacturing industry (Kianto and Andreeva 2014).

To some extent, this study provides a new understanding of the impacts of industries on the KFOC-organisational performance relationships. It confirmed that the KFOC-overall organisational performance relationship was strengthened in service industries. Therefore, knowledge managers in service industries should be more dedicated to fostering a KFOC in their organisations.

6.2.2 Research question group II: Knowledge-based leadership related

- *Research question 1.2: To what extent the knowledge-based leadership is related to organisational performance*

The knowledge-based leadership is positively related to organisational performance and is supported by the accumulative results revealed in this study. Consistent with the literature (Hsu, 2008; Jain and Moreno, 2015; Kamhawi, 2012; Mousavizadeh *et al*., 2015; Mageswari *et al*., 2017; Noruzy *et al*., 2013; Pee *et al*., 2010; Samson *et al*., 2017), firstly, knowledge-based leadership is strongly associated with the overall organisational performance by displaying a significant comprehensive effect size ($r_{KBL\text{-}OOP}$= 0.420), supporting $H2_1$. Secondly, a positive relationship between the knowledge-based leadership and financial performance of firms with a significant integrative effect size ($r_{KBL\text{-}FP}$= 0.279) was revealed and this result is in line with the findings of the earlier separate work (García-Morales *et al*., 2008; Lee and Choi, 2010; Hartono *et al*., 2016), and $H2_2$ was supported. Hypothesis $H2_3$ was also supported by showing a positive overall effect size ($r_{KBL\text{-}NFP}$= 0.441) of the knowledge-based leadership-non-financial

performance relationship. Earlier studies (Gowen *et al*., 2009; Jain and Moreno, 2015; Lee *et al*., 2012; Mousavizadeh *et al*., 2015; Mageswari *et al*., 2017; Sucahyo *et al*., 2016; Tan and Wong, 2015) also matched this finding as well.

These reassuring findings can be interpreted in the following aspects. Top executives' commitment to KM stirs employees' passion for active participation in KM. Understanding the importance of knowledge was consensus in the whole organisation through the influence of knowledge-based leadership. It is efficient for employees to solve problems using the collective knowledge of the organisation because of adequate investment in KM. In addition, employees are motived by managers to continuously learn and absorb new knowledge to enhance their capability. Organisations tend to utilise and create knowledge more effectively than their competitors who lack the knowledge-based leadership. Therefore, organisations can achieve better performance when their management teams demonstrate strong knowledge-based leadership sustainably because knowledge is efficiently and effectively managed.

This study provides the first comprehensive assessment of the relationships between knowledge-based leadership and organisational performance which complements the earlier research of Inkinen (2016) and Gupta and Chopra (2018) through combining a large number of research subjects across different studies (3,262 subjects from ten studies for the knowledge-based leadership-overall organisational performance relationship, 1,166 subjects from five studies for the knowledge-based leadership-financial performance relationship, and 1,933 subjects from ten studies for the knowledge-based leadership-non-financial performance relationship). The present study also expands our knowledge by offering specific accumulative magnitude between the knowledge-based leadership and overall organisational performance, the knowledge-based leadership and financial performance, and the knowledge-based

leadership and non-financial performance. The knowledge-based view is specified by pointing out that knowledge-based leadership can enable knowledge to efficiently flow within organisations and thus improve the value of organisations. All in all, these findings significantly expand the generalisability of the positive effects of knowledge-based leadership on organisational performance.

The findings revealed from research question 1.2 are of broad use to the communities of knowledge managers. Firstly, the study provides strong empirical confirmation on the relationship between the knowledge-based leadership and organisational performance which can be used to persuade managers to change their leadership styles into a knowledge-based one. Secondly, knowledge managers are helped to enhance their capability to influence their subordinates on KM processes and activities through following aspects: (1) managers should demonstrate an active attitude towards KM and passionately participate in KM activities; (2) managers should value knowledge for their business development; (3) managers should allocate sufficient resource to implement KM projects; (4) managers should motivate employees on positive knowledge-related behaviour and results; (5) a top executive, such as chief knowledge officer, should be assigned to lead KM activities for the organisation.

- *Research question 2.1.2: Does national culture moderated the knowledge-based leadership-organisational performance relationships?*

Nearly all the comparisons, except individualism versus collectivism for the knowledge-based leadership-non-financial performance relationship, were insignificant, which did not support the proposed hypotheses concerning the impacts of national culture on the knowledge-based leadership-organisational performance relationships (except H_{ICb3}). In addition, some overall effects in two groups of some

national culture dimensions were contradictory. For instance, the overall effect size was larger in larger power distance societies for the knowledge-based leadership-overall organisational performance relationship and the knowledge-based leadership-non-financial performance relationship, but the overall effect size was larger in small power distance societies for the knowledge-based leadership-financial performance relationship. Similarly, the overall effect size was larger in weak uncertainty avoidance societies for the knowledge-based leadership-overall organisational performance relationship and the knowledge-based leadership-non-financial performance relationship, but the overall effect size was larger in strong uncertainty avoidance societies for the knowledge-based leadership-financial performance relationship. On the other hand, the overall effect size was larger in feminine societies than in masculine societies for the knowledge-based leadership-overall organisational performance relationship and the knowledge-based leadership-non-financial performance relationship. The overall effect size was larger in long-term oriented societies and in restrained cultures, which was consistent for all three types of organisational performance. An expected result was found for the relationship between knowledge-based leadership and non-financial performance when different degrees of individualism were compared, which implied that this relationship was strengthened in collective societies ($r_{individualism}$= 0.253*** < $r_{collectivism}$= 0.554***), supporting H_{ICb3}. Similarly, the knowledge-based leadership-overall organisational performance relationship was stronger in collective societies, but the comparison was insignificant. In contrast, the knowledge-based leadership-financial performance relationship was stronger in individualistic societies and the comparison was insignificant. A possible interpretation might be because employees in collective societies tend to behave and imitate their leaders in showing their belonging to the group (Hofstede *et al*., 2010).

The contradiction from the knowledge-based leadership-financial performance relationship might be due to the lack of an adequate number of studies (N= 5) for this relationship.

As one of few studies investigating the knowledge-based leadership in multiple cultural backgrounds, the theoretical implications of this study, firstly, expand our understanding about the national culture on the knowledge-based leadership-organisational performance relationship; secondly, it contributes to KM theory by confirming that the overall effect size of the knowledge-based leadership-non-financial performance relationship would significantly be strengthened in collective societies; thirdly, it offers valuable insights for international business research by linking knowledge-based leadership and its benefits in a cross-cultural background.

The findings are relevant to managers, especially for those who work in multi-national companies. They should understand that the diversity of national culture has an impact on KM and should differentiate KM initiatives in different cultural backgrounds to meet the underlying social norms of employees. For instance, demonstrating knowledge-based leadership to a group of people might be more effective in collective societies, but it might be more effective to do so to individuals in individualistic societies. Managers should change their leadership styles to fit different situations.

- *Research question 2.2.2: Does national economy moderated the knowledge-based leadership-organisational performance relationships?*

Comparisons between developed economies and developing economies for the knowledge-based leadership-organisational performance were inconsistent. It was found that the overall effect size was larger in developed economies for knowledge-based leadership-financial performance, but this comparison was insignificant. In

contrast, it was found the overall effect size was larger in developing economies for the knowledge-based leadership-overall organisational performance relationship and the knowledge-based leadership-non-financial performance relationship, whilst the comparisons of different economies for the knowledge-based leadership-non-financial performance relationship were significant but were insignificant for the knowledge-based leadership-overall organisational performance relationship. Specifically, the knowledge-based leadership-non-financial performance relationship was strengthened in developing economies, rejecting H_{Eb3} ($r_{developed}$= 0.203***< $r_{developing}$= 0.530***).

These results are likely to be related to the unbalanced social development between developed and developing economies. For the last hundreds of years, developed countries have led the industrial revolutions and devised management theories and practices to facilitate the industrialisation of their countries. The economies of developed countries are still growing, but the growth rate is slowing down. Therefore, it is necessary for developed economies to invent more advanced KM theories and practices to boost development. Nevertheless, KM practices, e.g. knowledge-based leadership is still new in developing economies as the management theories and practices in developing economies are far behind those in developed countries. Once these new KM practices are implemented in developing economies, it will help firms to improve their performance. The converse result from the knowledge-based leadership-financial performance relationship might be due to a small number of samples (N= 5).

This work contributes to existing knowledge of KM by providing an empirical comparison between different economies' impact on the knowledge-based leadership-organisational performance relationships. It is one of few studies that has investigated knowledge-based leadership and its benefits in different economies, which extends

prior studies, such as those by Inkinen (2016) and Gupta and Chopra (2018). Managers from different economies are recommended to seriously consider the role of KM in their business. For managers in developed economies, their KM practices should be upgraded to a more advanced level, such as a chief knowledge officer appointment to sustain their competitive advantages. For managers in developing economies, they should continue to learn from their counterparts in developed economies and show more positive knowledge-based leadership to their subordinates.

- *Research question 2.3.2: Does the type of industry moderate the knowledge-based leadership-organisational performance relationships?*[10]

It was found that the knowledge-based leadership-non-financial performance relationship was strengthened in manufacturing industry compared to service industries ($r_{service}$= 0.203** < $r_{manufacturing}$= 0.582***), as the categorical analysis was significant, which rejected H_{Ib3}. Likewise, the overall effect size of the knowledge-based leadership-overall organisational performance relationship was larger in manufacturing industry as well, but the group comparisons were insignificant. Several factors may influence this observation. The majority of frontline employees in the manufacturing industry are blue-collar workers who work with machines and products rather than people. These blue-collar workers are more likely to follow their supervisors, and the most necessary knowledge for them is how to improve productivity and ensure product quality. Once the supervisors of the blue-collar workers show powerful knowledge-based leadership, the effectiveness and efficiency of knowledge application among the blue-collar workers would improve, especially on the non-financial performance of

[10] Whether industry has an impact on the knowledge-based leadership-financial performance relationship remains unanswered because the number of studies is too small to conduct the analysis.

firms reflected by product quality improvement, production efficiency, etc. Therefore, the knowledge-based leadership-non-financial performance relationship was stronger in the manufacturing industry.

The differences in industries that have been identified therefore assists in our understanding of the role of industries in the knowledge-based leadership-non-financial performance relationship, which deepens KM theory by providing empirical evidence of the contingency factor: industries, on the links between knowledge-based leadership and non-financial performance. This study is one of few studies that explore knowledge-based leadership and its payoffs in different industries, which responds to Inkinen's (2016) appeal for examining KM in different industrial settings and in adding new knowledge into the body of KM theory. Practical implications can also be provided from this study. It suggests that managers in manufacturing industry should be more active in demonstrating knowledge-based leadership to their subordinates. They need to pay frequent visits to the plant and communicate with frontline workers. The front-line employees can be easily motivated when they participate in KM activities with their supervisors.

6.2.3 Research question group III: Strategic KM related

- *Research question 1.3: To what extent the strategic KM is related to organisational performance*

It was found that strategic KM was related to the financial performance by the positive integrated effect size ($r_{SKM\text{-}FP}$= 0.269), supporting $H3_2$. Earlier studies (Claver-Cortés *et al*., 2018; Hartono *et al*., 2016; Mandal and Bagchi, 2016) also provided similar conclusions. This finding is in accord with the fact that strategic KM is a critical predictor of the success of KM, and successful KM can improve organisational

competitive advantages because strategic KM can be used to devise a guide for organisations to highlight KM at the strategic level, aligning KM to organisational business strategies. In other words, strategic KM focuses on creating inimitable value via knowledge to facilitate firms to realise its business vision and mission. Thus, firms which strategically manage their knowledge are likely to outperform their competitors in terms of financial situation. However, this study did not offer answers to the relationship between strategic KM and overall performance as well as the links between strategic KM and non-financial performance due to the limited number of studies. This might be a topic for the future.

This appears to be the first meta-analytic study which investigates the relationship between strategic KM and organisational performance, expanding the studies of Inkinen (2016) and Gupta and Chopra (2018). Despite the current study not revealing the strategic KM-overall organisational performance relationship and the strategic KM-non-financial performance relationship, the findings contribute to KM theory by correcting the mixed understandings about the strategic KM-financial performance relationship. It helps us to better understand and clarify the role of strategic KM on financial performance by providing a comprehensive effect size between strategic KM and financial performance based on 1,422 research subjects from eight studies. The generalisability about the positive role of strategic KM in financial performance is greatly improved.

For managerial implications, it is suggested that firms should manage organisational knowledge at the strategic level. Firms should align business strategies with their KM strategies and develop clear visions and objectives of their KM initiatives. The details of strategic KM should be thoroughly communicated to the whole organisation as well.

- *Research question 2.1.3:Does national culture moderate the strategic KM-organisational performance relationships?*

None of the comparisons regarding differences in national cultural dimensions was significant on the relationship between strategic KM and financial performance, and it appeared that the impacts of national culture on the strategic KM-financial performance were trivial. This unexpected finding might be caused by the limited number of studies (N= 7) involved in the analysis. On the other hand, the impacts of national culture on the strategic KM-overall organisational performance relationship and the strategic KM-non-financial performance relationship remain unknown because the number of the studies concerning these two relationships were limited when conducting the categorical moderator analysis.

- *Research question 2.2.3: Does national economy moderate the strategic KM-organisational performance relationships?*

Similarly, the differences in national economies did not reveal any impact on the strategic KM-financial performance relationship. This observation might be due to the small number of studies (N= 6) examined for this relationship. The impacts of the national economy on the strategic KM-overall organisational performance relationship and the strategic KM-non-financial performance relationship were still unclear because the number of the studies concerning these two relationships was too small to carry out the categorical moderator analysis.

- *Research question 2.3.3: Does the type of industry moderate the strategic KM-organisational performance relationships?*

Comparisons across industries for the strategic KM- financial performance relationship was significant, but the relationship was stronger in manufacturing industry than in service industries. This rather contradictory result may be due to the diversity of service industries when some service industries are less knowledge-intensive than some manufacturing industries (Kianto and Andreeva 2014) or the small number of studies (N= 4) included in the comparison. This finding implies that KM practitioners should consider the differences across industries and figure out appropriate strategic KM initiatives to meet their business needs.

6.2.4 Research question group IV: KM strategies related

- *Research* question *1.4: To what extent the KM strategies (the knowledge codification strategy /the knowledge personalisation strategy) are related to organisational performance*

The knowledge codification strategy was positively related to overall organisational performance ($r_{KCS\text{-}OOP}$= 0.345), supporting $H4_{11.}$ The finding agrees with the results of other studies (Hasan *et al.*, 2015; Shahzad *et al*., 2016; Shehata, 2015). The finding also indicated that the knowledge codification strategy positively affected financial performance ($r_{KCS\text{-}FP}$= 0.274), supporting $H4_{12}$. The work of others in linking the codification strategy with financial performance (Chen and Huang, 2014; Cohen and Olsen, 2015; Payal *et al*., 2016) also supported this conclusion. A significantly positive overall effect size ($r_{KPS\text{-}OOP}$= 0.208) determined that the knowledge personalisation strategy was positively associated with overall organisational performance, supporting $H4_{21}$. Similarly, the results of previous studies (Hasan *et al*., 2015; Shahzad *et al*., 2016) also echoed this finding.

It was indicated that appropriate KM strategies are vital predictors of organisational performance because organisations can bridge knowledge gaps with clear KM strategies. Firstly, it showed that the knowledge codification strategy was positively associated with overall organisational performance and financial performance. For example, if knowledge is mainly stored in employees' brains in an organisation, the codification strategy is important, particularly when the turnover rate of employees is very high, or baby boom born leaders are going to retire from the organisation. Organisations can reuse this codified knowledge when employees leave. The more knowledge codified, the less the influence on organisational performance induced from knowledge loss. Secondly, the knowledge personalisation strategy is also positively related to overall organisational performance. The knowledge personalisation strategy emphasises knowledge sharing and transfer among employees. Employees can get the knowledge that they need to solve their problems in their jobs within social networks. In this case, effective knowledge transfer and application can be easily turned into organisational value, achieving better organisational performance. However, future studies should continue to explore the knowledge codification-non-financial performance relationship, the knowledge personalisation-financial performance relationship, and the personalisation-non-financial performance relationship which did not provide specific answers because of the small number of such studies.

This is the first comprehensive meta-analytic study which examined and clarified the relationship between KM strategies and organisational performance. It contributes to KM theory by providing definite answers on the magnitudes of the relationship between the knowledge codification strategy and overall organisational performance, the relationship between the knowledge codification strategy-financial performance, and the relationship between the knowledge personalisation strategy and overall

organisations performance based on 1,084 subjects in six studies, 740 subjects in five studies, and 994 subjects in five studies, respectively. Our knowledge from previous studies, such as Inkinen (2016) and Gupta and Chopra (2018) on the strategic KM-organisational performance relationships is expanded. The generalisability of these findings is more convincing than in individual studies.

This study helps us better understand the knowledge-based theory from the KM strategies application perspective and offers feasible managerial implications. KM practitioners need to select advantageous KM strategies that align with their business needs. For example, the knowledge codification strategy should be prioritised if employee turnover rate is high in an organisation, whereas the knowledge personalisation strategy should be implemented when employees greatly depend on others' tacit knowledge to accomplish their tasks. The knowledge codification strategy and knowledge personalisation strategy are not mutually exclusive, but they are complementary to each other. Therefore, KM practitioners should evaluate their internal business requirements and external contexts. The following discussion offers some insights for KM practitioners to understand the impacts of contextual factors when they implemented KM strategies.

- *Research* question *2.1.4: Does national culture moderate the knowledge codification- /personalisation strategy-organisational performance relationships?*

Only the impacts of national culture on the knowledge codification strategy-overall organisational performance relationship and the knowledge codification strategy-financial performance relationship were analysed, but firstly, it was revealed that the knowledge codification strategy-overall organisational performance relationship was strengthened in a restrained culture ($r_{indulgence}$= -0.190*< $r_{restraint}$= 0.382***). This

finding might be explained by the fact that people in a restrained culture are more likely to depend on codified knowledge and they are not skilled in communicating with others, especially with strangers, which hinders their tacit knowledge acquisition. Secondly, it was found that the knowledge codification strategy-financial performance relationship was strengthened in collective societies ($r_{individualism}$= 0.183**< $r_{collectivism}$= 0.332***). The cause of this result might be explained by the fact that people in collective societies are more likely to feel responsible for the development of their group and are more eager to codifying their knowledge for their members in the same group, whereas people in individualistic societies are more independent and less likely to codify knowledge for others. In addition, the empirical evidence could not specify the impacts of national culture on the knowledge personalisation strategy-organisational performance relationship due to insignificant comparisons for the knowledge personalisation strategy-overall organisational performance relationship and an insufficient number of studies for the knowledge personalisation strategy-financial performance relationship and the knowledge personalisation strategy-non-financial performance relationship.

This is one of few studies that address national culture in examining KM strategies and organisational performance, which makes valuable contributions to KM theory and international business research. It creates new knowledge on the role of national culture in affecting KM strategies by confirming that the knowledge codification strategy-overall organisational performance relationship was strengthened in a restrained culture and the knowledge codification strategy-financial performance relationship was strengthened in collective societies.

The findings are crucial to knowledge managers as these findings provide practical guidelines for them. Knowledge managers should understand besides internal

obstructions, external factors, such as national culture, might facilitate or impede the KM activities. Knowledge managers in multi-national companies should understand that KM benefits might be achieved by very different means in different cultural settings. For instance, emphasising on collective knowledge codification strategies might have low efficiency in individualistic societies but would be highly acceptable in collective societies. In addition, the knowledge codification strategy might be not welcomed if the knowledge codification process is tedious in indulgence-oriented societies, but it might be not a problem in restrained cultures as leisure is not quite valued in a restrained culture.

- *Research question 2.2.4:* Does *national economy moderate the knowledge codification /personalisation strategy-organisational performance relationships?*

The impacts of the national economy on the knowledge codification /personalisation strategy-organisational performance relationships remain unknown due to either insignificant group comparisons for the knowledge codification strategy-financial performance relationship or an inadequate number of studies. This answer to this question is surely worth exploring in the future.

- *Research question 2.3.4: Does the type of industry moderate the knowledge codification /personalisation strategy-organisational performance relationships?*

The impacts of industries on the knowledge codification /personalisation strategy-organisational performance relationships cannot be clearly answered due to either insignificant category comparisons for the tested relationships or an inadequate number of studies. Future studies should be conducted to answer this question.

6.2.5 Research question group V: KM-supportive IT related

- *Research question 1.5: To what extent KM-supportive IT is related to organisational performance*

The empirical result of this study ($r_{KMSIT\text{-}OOP}$= 0.440) demonstrated that KM-supportive IT was positively related to overall organisational performance, supporting $H5_1$. This finding broadly supports the work of other studies (Choe, 2016; Kamhawi, 2012; Kroh *et al*., 2018; Mageswari *et al*., 2017; Pee *et al*., 2010; Wang *et al*., 2007; Wong and Wong, 2011) linking KM-supportive IT with overall organisational performance, also echoing this finding. In addition, a positive overall result ($r_{KMSIT\text{-}FP}$= 0.366) was revealed which corroborated the findings of a great number of previous studies (Chen and Huang, 2014; Jain and Moreno, 2015; Kamath *et al*., 2016; Maiga *et al*., 2013; Lee and Lee, 2007; Roldán *et al*., 2014; Soto-Acosta *et al*., 2018; Tanriverdi, 2005; Vaccaro *et al*., 2010; Valdez-Juárez *et al*., 2018), arguing that KM-supportive IT was positively related to the financial performance of firms, which supported $H5_2$. The integrated result ($r_{KMSIT\text{-}FP}$= 0.442) of the KM-supportive IT-non-financial performance relationship is in keeping with earlier studies of Lee *et al*. (2012); Lee and Lee (2007), Liang *et al*. (2013); Mageswari *et al*. (2017); Maiga *et al.* (2013); and Valdez-Juárez *et al*. (2018), in which supported the notion that KM-supportive IT was positively related to non-financial performance. $H5_3$ was supported.

The accumulative findings of the relationships between KM-supportive IT and organisational performance from such a large number of subjects were inspiring and suggest that payoff of KM-supportive IT is positive to organisations. Several factors can explain these findings. Firstly, the KM-supportive IT facilitates knowledge flows (Lee *et al.*, 2019) and processes, such as knowledge creation, acquisition, sharing

(Nguyen *et al*., 2019), transferring, searching, retention and application of organisations (Lee and Lee, 2007; Gold *et al*., 2001); Secondly, the KM-supportive IT enables smoothly communication and collaboration (Chen *et al*., 2011) so that employees can obtain the needed knowledge to deal with their tasks more easily. Thirdly, KM-supportive IT can help organisations to solve complicated problems and support decision making (Kianto and Andreeva, 2014; Valdez-Juárez *et al*., 2018), for example, knowledge can be extracted by big data analytics. Overall, KM-supportive IT improves organisations' capability to more effectively and efficiently manage their intellectual resources and results in satisfying organisational performance.

This is the first meta-analytic study that evaluated the KM-supportive IT-organisational performance relationships, that expanding the study of Inkinen (2016) and Gupta and Chopra (2018). Before this study, evidence on the relationship between KM-supportive IT and organisational performance was contradictory and inconsistent. This is the largest study so far confirming that KM-supportive IT were positively related to overall organisational performance, with 5,260 subjects in twenty studies, financial performance with 3,046 subjects in fourteen studies, non-financial performance with 3,747 subjects in nineteen studies, which notably improves the generalisability of the conclusions of this study. This deepens our understanding of knowledge-based theory by offering concrete empirical evidence between KM-supportive IT and organisational performance.

The findings can be used to help KM practitioners to implement KM-supportive IT in solving disputable issues. Several managerial suggestions can be helpful for KM practitioners. Firstly, organisations should continuously invest in KM-supportive IT; secondly, organisations should take advantage of KM-supportive IT tools and platforms to facilitate knowledge processes, such as knowledge creation, acquisition, sharing,

transferring, searching, retrieving, retention, and application; thirdly, KM-supportive IT for collaboration and communication, such as instant messaging systems, teleconference systems should be provided in organisations, which is extremely important nowadays as COVID-19 has spread to many countries; fourthly, some advanced KM-supportive IT, such as artificial intelligence, big data analytics should be deployed when necessary; finally, a group of IT talents (Bennett and Hall, 2020) should be fostered to help organisations to deal with any potential problems on KM-supportive IT applications.

- *Research question 2.1.5: Does national culture moderate the KM-supportive IT-organisational performance relationships?*

None of the categorical comparisons of the national cultural dimensions was significant, which suggests that the impacts of national culture on the KM-supportive IT-organisational performance relationships are neglectable. The reasons for this observation might be explained by the following factors. As the internet, computers, and smartphones have become popular around the world, people nowadays are unprecedently familiar with IT applications. These IT applications, especially social media tools, such as Facebook, Twitter, and Tik Tok intensively enable people to communicate more easily and rapidly expand their social networks in obtaining knowledge from multiple channels. On the other hand, KM-supportive IT are so agile that it can be customized for any organisations when necessary. Such customisation might mitigate the negative impacts of national culture on KM-supportive IT implementation.

As one of few studies that have examined KM-supportive IT across cultures, this study contributes to KM literature and international business research by comparing the

effects of different national cultural dimensions on the KM-supportive IT-organisational performance relationship. Despite the comparisons being insignificant, the findings have still extended our knowledge of KM-supportive IT in different national cultures.

The findings seem to suggest that managers might ignore the impacts of national culture on KM-supportive IT deployment; however, KM practitioners should consider KM-supportive IT in different cultural backgrounds. For specific cases, it is still recommended that KM practitioners should systematically evaluate the trade-off between KM-supportive IT and the impacts of national culture.

- *Research question 2.2.5: Does national economy moderate the KM-supportive IT-organisational performance relationships?*

It was found that the KM-supportive IT-financial performance relationship was strengthened in developing economies ($r_{developed}$= 0.224***< $r_{developing}$= 0.442***) due to significant categorical analysis, which rejected H_{Ee2}. The conclusion applies to the KM-supportive IT-overall organisational performance relationship and the KM-supportive IT-non-financial performance relationship, but the categorical analysis based on differences in economies was insignificant for these two relationships.

There are several possible explanations for these findings. IT development is not balanced between developed and developing economies as most of the state-of-the-art technologies were invented, developed, and applied in developed economies. Therefore, application of KM-supportive IT is normal for firms in developed economies, and it is quite difficult to achieve extra benefits based on the homogeneous technical resources. In contrast, many KM-supportive IT are still new in developing countries, the firms who are successfully equipped with KM-supportive IT have new

technical resources to improve their capability in managing knowledge efficiently in developing economies. Therefore, firms in developing economies are more likely to benefit from KM-supportive IT than in developed economies.

This is one of few studies that has assessed the role of the national economy in KM-supportive IT. It offers valuable insights into the KM literature and international business research by examining the KM-supportive IT-organisational performance relationships in different economies. The findings of this study highlight the clear usefulness of KM-supportive IT in different economies. For instance, firms in developed economies should apply more advanced KM-supportive IT, such as 5G, big data analytics, artificial intelligence more quickly than their rivals to gain more business value. While firms in developing economies should continuously invest in and upgrade KM-supportive IT to sustain their competitive advantages.

- *Research question 2.3.5: Does the type of industry moderate the KM-supportive IT-organisational performance relationships?*

Categorical comparisons in different industries for the KM-supportive IT-organisational performance relationships were insignificant so that such differences did not significantly affect KM-supportive IT-organisational performance relationship. A possible explanation for these findings might be due to the wide application of KM-supportive IT. For example, KM-supportive IT, such as email, knowledge repositories, portals, teleconference tools, etc., are not only used in firms in the service industries but are also widely used in manufacturing industry. It is difficult to differentiate the payoffs of KM-supportive IT across industries by such extensive applications of KM-supportive IT.

This is one of few meta-analytic studies that has investigated the KM-supportive IT-organisational performance relationships in different industries. It adds new knowledge into KM theory by providing additional evidence with respect to the impacts of industries by KM-supportive IT, which extends the work of Inkinen (2016) and Gupta and Chopra (2018), and responds to the suggestions of Gelfand *et al*. (2007) and Tsui *et al*. (2016) by considering industrial factors in management research. Managerial guidelines are also provided for KM practitioners. Though the differences between service and manufacturing industries were insignificant, it does not mean the KM-supportive IT can be abused without considering actual requirements of a firm in a specific industry. Knowledge managers still need to maximize their KM-supportive IT solutions based on their business needs to help their organisation to achieve competitive advantages.

6.2.6 Research question group VI: Organisational learning related

- *Research question 1.6: To what extent the organisational learning is related to organisational performance*

A positive accumulative effect size ($r_{OL\text{-}OOP}$= 0.454) of the organisational learning-overall organisational performance relationship is reported in this study, supporting $H6_1$. This finding matched those observed in previous studies (Chien and Tsai, 2012; Choe, 2016; Hussain *et al*., 2018; Hu, 2013; Kharabsheh *et al*., 2014; Kim *et al*., 2010; Lin *et al*., 2013; Noruzy *et al*., 2013; Rao *et al*., 2015; Real *et al*., 2014; Ruiz-Mercader *et al*., 2006), which implies that organisational learning is a vital indicator of overall organisational performance. The empirical evidence ($r_{OL\text{-}FP}$= 0.278) also revealed that organisational learning was positively related to financial performance, supporting $H6_2$, which agrees with other studies (Bueno *et al*., 2010; Feng *et al*., 2014; Forés and

Camisón, 2011; García-Morales *et al*., 2007; García-Morales *et al*., 2008; Inkinen and Kianto, 2014; Lee and Lee, 2007; Lee and Huang, 2012; Li *et al*., 2011; Maiga *et al*., 2013; Pett and Wolff, 2016; Rhodes *et al*., 2008; Roxas *et al*., 2014; Sirén *et al*., 2012). Additionally, the findings of this study on the relationship between organisational performance and non-financial performance supported the ideas of earlier studies (Lee *et al*., 2012; Lee and Lee, 2007; Maiga *et al*., 2013; Ngah *et al*., 2016; Salge and Vera, 2013) by providing a positive overall effect size ($r_{OL\text{-}NFP}$= 0.472), suggesting that organisational learning is positively associated with non-financial performance, which supported $H6_3$.

These findings can be interpreted by the following reasons. Organisational learning emphasises knowledge acquisition and integration through the continuous commitment to learning as well as sustainable investment in training. Such continuous learning and training commitment improves employees' skills in managing knowledge and leads to better organisational performance (Oh, 2019). At the same time, organisations can more effectively update and integrate their knowledge by continuous organisational learning so that survival of the organisations can be guaranteed and the overall organisational capability to create value via knowledge is improved.

This study has been one of the first attempts to thoroughly examine the organisational learning-organisational performance relationship through a meta-analysis approach, which adds to the growing body of the KM literature by indicating the positive associations between the organisational learning and organisational performance. These positive associations were generalised by analysing large volumes of research subjects (3,649 subjects from twenty studies for the organisational learning-overall organisational performance relationship, 7,219 subjects from twenty studies for the organisational learning-overall organisational performance relationship, and 2,408

subjects from ten studies for the organisational learning-overall organisational performance relationship) that improve the generalisability of the positive impacts of organisational learning on organisational performance. It also expands previous review studies, such as those by Inkinen (2016) and Gupta and Chopra (2018) by adding organisational learning into the KM practices framework and providing the clear-cut magnitudes of the organisational learning- organisational performance relationships.

These findings have important managerial implications for developing organisational learning in organisations. Firstly, organisations should focus on creating, acquiring, and apply knowledge through learning; secondly, the continuous learning commitment of employees should be encouraged, and thirdly, training should be provided to all employees to improve their skills.

- *Research question 2.1.6: Does national culture moderate the organisational learning-organisational performance relationships?*

Some dimensions of national culture had an impact on the organisational learning-organisational performance relationships due to the significance of the categorical comparisons. The significant group comparison revealed that the organisational learning-non-financial performance relationship was more strengthened in large power distance societies than in small power distance societies. In addition, the overall effect size in larger power distance societies was larger for organisational learning-overall organisational performance relationship and the organisational learning-financial performance relationship, but the group comparisons with respect to power distance for these two relationships were insignificant.

This finding could have been generated by the effect of organisational learning on reducing asymmetric knowledge distribution in large power distance societies. Most

knowledge is embedded in the top level of the organisational structure in large power distance societies, but organisational learning encourages the learning behaviour of all employees in the organisation, which breaks the knowledge monopoly of managers. Thus, front-line employees might have sufficient knowledge to achieve more value for the organisation. On the other hand, it is fair for employees in terms of acquiring knowledge in small power distance societies, therefore, the impacts of organisational learning on organisational value enhancement is not as obvious as in large power distance societies.

This study reported that the organisational learning-non-financial performance relationship was strengthened in collective societies based on significant categorical comparisons. In addition, it was also found the overall effect size for the organisational learning-financial performance relationship was larger in collective societies but was marginally smaller in collective societies. These findings might be explained by the core values of collective societies in which people are more likely to learn together. For instance, group learning is more effective in collective societies.

The organisational learning-financial performance relationship was strengthened in long-term oriented societies, supported by the significant categorical comparisons between long-term orientation and short-term orientation. In addition, it also revealed the overall effect size for the organisational learning-financial performance relationship was larger in long-term oriented societies but was smaller in long-term oriented societies for the organisational learning-overall organisational performance relationship. However, the overall effect sizes between long-term orientation and short-term orientation for the organisational learning-overall organisational performance relationship were identical. The different attitudes towards learning between long-term orientated and short-term oriented culture can explain these observations. Learning is

highly valued in long-term oriented cultures and people are willing to invest in learning, therefore, organisational learning perfectly matches the core value of long-term oriented societies by facilitating learning behaviour in organisations.

Remarkable findings that emerged from this study were that the overall effect size was strengthened in restrained cultures for the organisational learning-overall organisational performance relationship, the organisational learning-financial performance relationship, and the organisational learning-non-financial performance relationship, respectively. These results can be explained by people's perceptions of gamification and learning between indulgence-oriented and restraint-oriented cultures. People in indulgence-oriented cultures lack the commitment to learning (Gómez-Rey *et al*., 2016) and learning is less interesting than playing in most cases. People might consider it tiresome if the learning activities are unappealing in indulgence-oriented societies. In contrast, people would like to learn without too much consideration if the learning process is joyful or not. Thus, organisational learning is more effective in affecting organisational performance in restrained cultures.

This is one of the first studies that have attempted to examine the impacts of national culture on the organisational learning-organisational performance relationship, which contributes to KM theory and international business research by providing new knowledge. It expands our knowledge on the influence of national culture on organisational learning and its benefits by providing empirical evidence from the effects of different degrees of power distance, individualism, and indulgence on the organisational learning-non-financial performance relationship, the effects of different extents of long-term orientation and indulgence on the organisational learning-financial performance relationship, and the effect of different degrees of indulgence on the organisational learning-overall organisational performance relationship.

This research has shed contemporary light on the application of organisational learning, especially for multi-national companies. KM practitioners should understand the differences in national cultures when initiating organisational learning. For instance, KM practitioners should try to break down the knowledge monopoly in large power distance societies to facilitate knowledge smoothly flowing to the bottom of organisations. In addition, KM practitioners should pay attention to the different learning styles between individualistic and collective societies. It is necessary to provide more incentives for learning in short-term oriented cultures. The designs of organisation learning in indulgence-oriented societies should be more attractive and interesting so as to appeal to employees to participate in learning.

- *Research question 2.2.6: Does national economy moderate the organisational learning-organisational performance relationships?*

On the research question 2.6.2, it was found that the organisational learning-non-financial performance relationship was strengthened in developing economies rather than in developed economies based on the significance of categorical comparisons. This conclusion was applicable for the organisational learning-overall organisational performance relationship and the organisational learning-financial performance relationship, but the categorical comparisons regarding national economies were insignificant. These findings can be interpreted by the differences in social development between different economies. More talents have been fostered in developed economies for the past hundreds of years during industrialisation; however, fewer talents can be found in developing economies where the national education systems are relatively poor. Once the organisation learning is initiated in developing countries, the skills of employees can be significantly improved. In contrast, such improvement in developed

economies might not be as obvious as in developing economies because the organisational development is rather mature and learning activities are more homogeneous in developed economies. These findings suggest that firms in developed economies should adopt more novel managerial applications to facilitate organisational learning so as to enhance their competitive advantages, whilst firms in developing economies should continuously encourage the learning behaviour of employees and continuously invest in organisational learning. In addition, firms in developing economies should benchmark their organisational learning activities with their competitors from developed economies to sustain their competitive advantages.

- *Research question 2.3.6: Does the type of industry moderate the organisational learning-organisational performance relationships?*

Categorical comparisons between different industries for the organisational learning-organisational performance relationships were insignificant as the overall effect sizes did not significantly differ between manufacturing industry and service industries. It seems possible that these findings might be due to the similarities of learning and training practices in firms, despite the firms being from different industries.

This work expands previous studies, such as Inkinen (2016) and Gupta and Chopra (2018), by gaining a deeper understanding of the impacts of industries on the organisational learning-organisational performance relationship. Though the empirical evidence did not show any differences between different industries for organisational learning, KM practitioners should still actively advocate and deploy organisational learning in their organisations as organisational learning is positively related to organisational performance. In addition, it is still essential to consider specific requirements when carrying out organisational learning in specific industries.

6.2.7 Additional findings that emerged from this study

Besides these reassuring positive relationships between the KM practices and organisational performance, surprising findings were also revealed when effect sizes between some KM practices (including KFOC, knowledge-based leadership, KM-supportive IT, and organisational learning) and different types of organisational performance were compared (overall organisational performance, financial performance, and non-financial performance). It showed that the overall effect sizes between these KM practices and non-financial performance were the strongest, while the overall effect sizes between these KM practices and financial performance were the smallest and the overall effect sizes between these KM practices and overall organisational performance were in the middle.

These findings imply that such KM practices are much stronger in predicting non-financial performance because they cater for people's needs by equipping them with knowledge and emphasising collaboration and interaction with others to learn, share, and apply knowledge. During these processes, trust, collaboration and mutual understanding with internal and external stakeholders gradually accumulate once barriers are overcome, which decreases misunderstandings among employees and external stakeholders and is more likely to reduce the mistakes of employees. Therefore, non-financial performance, such as employee job satisfaction, customer satisfaction, organisational image and reputation, efficiency improvement, cost reduction, etc. are easily affected by the adoption of KM practices in a short time. On the other hand, it seems that these KM practices are less correlated with financial performance compared with non-financial performance. This phenomenon might be explained by the time lag effect of KM initiatives on financial performance. Financial performance is always measured or reported in a relatively short period, like quarterly, or annually. However,

it takes time for organisations to digest and absorb KM practices to appropriately function as expected. For instance, Lee *et al.* (2020) reported that KM yields financial returns from the second year of their investigation. In addition, many other factors impact on firms' financial performance, such as government regulations, economic crises, international trade wars, and pandemics etc. Thus, compared with other factors, the impact of KM practices on financial performance might take more time to be reflected. Compared with other measurements of organisational performance, KM practices are less effective in affecting financial performance, but it was found that they are still positively related to financial performance.

These surprising findings that emerged are difficult to obtain from an individual study because the individual study mainly focuses on one or two types of organisational performance when it was conducted. This study has improved the generalisability of these findings across a large number of studies, which helps us to better understand the role of KM in affecting organisational performance. It also offers valuable insights for KM application and KM benefits measurement for organisations. For example, it is a feasible strategy for firms to embark on KM projects by focusing on non-financial performance (such as cost deduction, mistakes avoidance) improvement as an entry point because non-financial KM benefits can be obtained more quickly.

6.3 Summary of theoretical contributions

This study tried to draw a holistic figure of KM practices and organisational performance via the meta-analysis approach and to contribute to management theory in the following aspects. Firstly, this is the first research synthesis that examines the complex relationships between KM practices and organisational performance using the meta-analysis approach. It extends the previous studies of Inkinen (2016) and Gupta

and Chopra (2018) by showing the clear-cut comprehensive magnitudes between KM practices and organisational performance based on integrative analysis of a large number of studies (the minimum total sample size was 740 from the codification strategy-financial performance relationship while the maximum total sample size was 9,515 from the KFOC-overall organisational performance relationship). The empirical evidence from this study has reduced the heterogeneity of the KFOC, knowledge-based leadership, KM-supportive IT, and organisational learning-organisational performance (overall organisational performance, financial performance and non-financial performance) relationships as well as the strategic KM-financial performance relationship, the knowledge codification strategy-overall organisational performance relationship, the knowledge codification strategy-financial performance relationship, the knowledge personalisation strategy-overall organisational performance relationship. These findings are revealed for the first time with a holistic perspective and have significant implications for the understanding of how and to what extent the KM practices are related to the organisational performance by enhancing generalisability across studies. It not only strengthens the knowledge-based view but also points out that specific KM practices, such as KFOC, knowledge-based leadership, strategic KM, knowledge codification strategy and knowledge personalisation strategy, KM-supportive IT, and organisational learning facilitating knowledge processes are critical for organisational performance enhancement. It also helps to solve the puzzles about the KM practices-organisational performance relationship of KM experts worldwide (Heisig *et al*., 2016) by offering empirical evidence.

In addition, responding to King (2007) and Gupta and Chopra (2018)'s concern about the impacts of social contexts, such as national culture and economy on KM, this is a rare study that links KM theory with international business research by investigating

the moderating effects of national culture and economy on the KM practices-organisational performance relationships, which is difficult to be implemented in an individual study. Expanding the study of Hussinki *et al*. (2017), this research confirmed that some dimensions of national culture influenced some KM practices -organisational performance relationships using moderating effect analysis, which suggests that national culture is an essential contextual factor that affects KM practices and their payoffs. It also highlighted the role of the economy in KM practices and organisational performance research, responding to the appeals of (Gelfand *et al*., 2007; Tsui *et al*., 2016) that organisational behaviour studies should examine the effects of multiple contexts beyond national culture. Evidence was shown that the knowledge-based leadership-non-financial performance relationship, the KM-supportive IT-financial performance relationship, and the organisational learning-non-financial performance relationship were strengthened in developing economies. These findings cannot be revealed by separated studies and it, therefore, can help scholars to understand KM practices and organisational performance with a deeper theoretical foundation.

Echoing Inkinen (2016)'s recommendation for investigation of KM-organisational performance based on industrial differences, it contributes to KM theory by confirming that industries are contingent factors which affect KM practices-organisational performance relationships. For instance, effect sizes of knowledge-based leadership-non-financial performance relationship and strategic-non-financial performance relationship were larger in the manufacturing industry than the service industry, while effect size of KFOC-overall organisational performance relationships was larger in the service industries. These findings enrich KM theory by offering new knowledge about the impacts of industries on KM practices-organisational performance relationships.

Finally, this study contributes to KM theory by auditing current knowledge with respect to KM practices-organisational performance relationships. It shows that some KM practices-organisational performance relationships are still not well studied. For instance, knowledge about the strategic KM-overall organisational performance relationship, the strategic KM-non-financial performance relationship, the codification strategy-non-financial performance relationship, the personalisation strategy-financial performance relationship, and the personalisation strategy-non-financial performance relationship and impacts of contextual factors on these relationships are still vague. Therefore, it is essential to examine these relationships with respect to different backgrounds in the future.

6.4 Summary of managerial implications

Besides the scientific significance, this study also provides valuable managerial implications which can help the KM practitioner community to better understand and deploy KM practices. Firstly, specific magnitudes of KM practices-organisational relationships across hundreds and thousands of samples were shown which provide useful empirical evidence and direct reasons for organisations to embark on KM initiatives; additionally, in line with Davenport *et al*. (1998) and Mousavizade and Shakibazad (2019), it is also recommended organisations to develop KFOC in which employees are passionate to learn, open to innovate, trust, collaborate with, and share knowledge with each other (Kianto *et al*., 2013); top executives should demonstrate strong leadership on KM by allocating sufficient resources to support KM and actively participate in KM activities (Liu *et al*., 2018a); it is also important for organisations to manage their knowledge at the strategic level and clearly define their KM strategies during strategic planning procedures (Serenko *et al*., 2017). KM strategies should align

with and support business strategies. The knowledge codification strategy and the knowledge personalisation strategy should be leveraged according to an organisation's business needs (Cohen and Olsen, 2015). Investment in KM-supportive IT is also necessary to facilitate KM activities in organisations (Lee *et al*., 2012). Organisational learning which emphasises a continuous commitment to learning and knowledge acquisition should be advocated and implanted in organisations (Oh, 2019).

Secondly, another implication of this study is that regional and contextual idiosyncrasies (Hussinki *et al*., 2017), such as national culture, economies, and industries should be taken into account when initiating KM. It implies that organisations, especially multinational companies, ought to consider cultural differences between the head and subunits when they conduct KM projects. It also suggests that organisations should not completely imitate others' KM projects without considering their own business issues and the environment because the local economy and industrial nature of their business might strengthen or weaken outcomes of KM practices.

Thirdly, despite this study offering specific magnitudes of KM practices-organisational performance relationships, it does not mean that organisations should only initiate high overall effect sizes KM practices. Organisations should evaluate their KM needs before initiating any KM practices (Yip *et al*., 2015). In other words, KM in organisations should be implemented in a systemic way based on their business needs and the requirements of employees, as well as the organisation, and should consider the impacts of contextual factors that surround them.

Finally, policy-makers are suggested to increase national and regional intangible assets through KM practices. The authorities should provide an open and fair environment for firms to compete through innovation and collaboration rather than de-globalisation and

lock-down. In addition, authorises should develop a set of policies that encourage national (regional) innovation, especially for SMEs, such as tax reduction, loans with low interest, etc. Authorities should also focus on building and upgrading information and telecommunication technological infrastructures, such as 5G, high-speed broadband, etc to facilitate knowledge communication. It is highly recommended that intellectual property should also be well protected.

6.5 Critiques and extensions

6.5.1 Limitations

In spite of the wide contributions of this study, specific limitations should be acknowledged. First, this study only selected papers in English written during 1975 to 2018 from the Scopus database which might suffer from a language bias and database bias, although such biases were considered limited, according to past research (Livingston *et al*., 2008). The possible weakness is that the power of the estimated effect sizes might be affected due to the selection bias.

Second, it was not possible to examine all the KM practices and their outcomes that appeared in the KM literature, such as, knowledge-based human resource management, communities of practice, knowledge exploration and exploitation strategy, and organisational structure due to the limited number of studies, therefore, the relationships between these KM practices-organisational performance relationships are unknown. This study mainly evaluated the direct effects between KM practices and organisational performance without considerating the impacts of KM practices interactions because the number of studies concerning the interactions of KM practices was very small. In addition, an arguable limitation is the definition of organisational learning in this study,

which only concentrates on intra-organisational learning without considering inter-organisational learning studies.

Third, another limitation which could have affected the moderating effects of national culture on the KM practices-organisational performance relationships was the binary classification of national culture based on Hofstede's national culture scores. The discrepancies from national culture moderating test might occur due to the national culture group assignment since some values that were close to the threshold were categorised into two different groups; in addition, some studies were excluded because the scores of indulgence versus the restrained culture was not available; therefore, the generalisability of the moderating effects of indulgence versus restrained culture might be restricted. The Hofstede's national culture approach can be also criticised because values of Hofstede's national culture dimensions cannot represent the current situation, for instance, Confucian countries are becoming more individualism-oriented nowadays (Minkov, 2018).

Fourth, coded industries were divided into two general categories and the effect sizes based on service and manufacturing industries were compared. However, detailed differences of the KM practices-organisational performance relationships in similar industries, such as banks and insurance companies, could not be scrutinised and deserves further investigation in the future. In addition, the applied categorical moderating test for the moderators was used which only can answer if the moderators were related to the effect sizes but cannot answer to what extent the moderators were related to the effect sizes. Future studies can explore how much these moderators are associated with the effect sizes of KM practices-organisational performance relationships.

Finally, an issue that was not addressed in this study was whether other variables contained in the research models of the selected papers have an impact on the accumulative effect sizes between KM practices and organisational performance. These moderating and mediating variables that appeared in individual studies could possibly affect the KM practices-organisational performance relationships.

6.5.2 Future directions

This research has thrown up many questions that need further scrutiny. Firstly, it six KM practices and their outcomes mainly examined, therefore, further studies are highly recommended to investigate the impacts of other KM practices, such as knowledge-based human resource management (Kianto and Andreeva, 2014; Inkinen, 2016; Gupta and Chopra, 2018), knowledge-oriented organisational structure (Heising, 2009; Inkinen, 2016; Gupta and Chopra, 2018), knowledge exploration and knowledge exploitation strategy on organisational performance through the meta-analysis approach. Similarly, meta-analytic studies regarding the role of knowledge processes, such as knowledge sharing, creation, transferring, application, protection, retention and so forth on organisational performance would be worthwhile because many studies focused on knowledge processes-organisational performance relationships. In addition, KM practices are interactive and can affect each other. For instance, knowledge-based leadership can help to create a KFOC meanwhile the KFOC can facilitate the effectiveness of the knowledge-based leadership. Future work can be carried out to examine the interactive effects of KM practices on different types of performance. The focus of this study was on examining the impacts of KM on performance in terms of organisational level, and future studies could also be conducted to determine the effectiveness of KM on employees' job performance, team performance as well as

innovation performance of firms (e.g. new product development, new progress implementation).

Secondly, moderating effect analysis of this study focused on contextual factors, such as national culture, economy and industry impacted on KM practices-organisational performance relationships. More research is required to check the generalisability of the findings in different settings, such as different types of respondents, sizes of organisations, empirical test methods, and publication types on the KM practices-organisational performance relationships. A model for future research is shown in Figure 6-1.

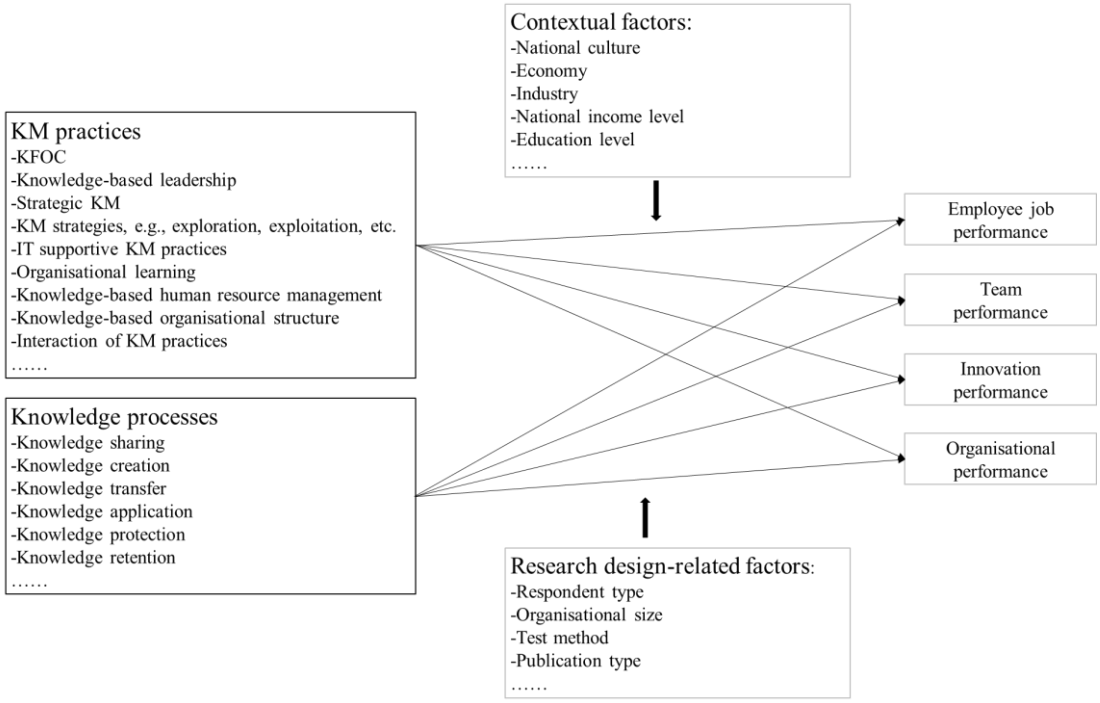


Figure 6-1: Research model for future studies

Thirdly, it was found that identical constructs were named differently in past publications, for instance, knowledge-based leadership was named in various ways, such as knowledge-oriented leadership (Donate and Sánchez de Pablo, 2015), supervisory work (Inkinen *et al*., 2015), and senior management commitment (Kim and Hancer, 2010). These inconsistent names in the KM vocabulary make it difficult to

understand KM, especially for KM freshmen. Future studies should target at devising a widely accepted and standard KM vocabularies to help people better understand KM.

Finally, some studies that were not appropriately designed or reported during the searching and coding processes were excluded. Future studies should look into these studies and offer constructive advice on conducting qualified empirical studies. In addition, new insights regarding KM and organisational performance are expected to be undertaken using novel methods, such as machine learning and big data analytics to analyse the large volume of long-term data.

6.6 Chapter summary

The final chapter of this thesis firstly summarises the findings which emerged from the meta-analysis presented in the previous chapters and then provides a deep discussion on these findings with respect to empirical results, possible explanations, theoretical contributions, and managerial implications based on six groups of questions and additional findings. It moves on summarising the theoretical contributions and practical implications from a holistic perspective of the study. It ends with the limitations and recommendations for future research.

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Appendices

Appendix I: National culture classification

SN	Country (Region)	PD	Code	IC	Code	FM	Code	UA	Code	LS	Code	IR	Code
1	Albania	90	L	20	C	80	M	70	S	61	L	15	R
2	Angola	83	L	18	C	20	F	60	W	15	S	83	I
3	Argentina	49	S	46	I	56	M	86	S	20	S	62	I
4	Australia	36	S	90	I	61	M	51	W	21	S	71	I
5	Austria	11	S	55	I	79	M	70	S	60	L	63	I
6	Bangladesh	80	L	20	C	55	M	60	W	47	L	20	R
7	Belgium	65	S	75	I	54	M	94	S	82	L	57	I
8	Bhutan	94	L	52	I	32	F	28	W	NA	NA	NA	NA
9	Brazil	69	L	38	C	49	M	76	S	44	L	59	I
10	Bulgaria	70	**L=70**	30	C	40	F	85	S	69	L	16	R
11	Burkina Faso	70	L	15	C	50	M	55	W	27	S	18	R
12	Canada	39	S	80	I	52	M	48	W	36	S	68	I
13	Cape Verde	75	L	20	C	15	F	40	W	12	S	83	I
14	Chile	63	S	23	C	28	F	86	S	31	S	68	I
15	China	80	L	20	C	66	M	30	W	87	L	24	R
16	Colombia	67	L	13	C	64	M	80	S	13	S	83	I
17	Costa Rica	35	S	15	C	21	F	86	S	NA	NA	NA	NA
18	Croatia	73	L	33	C	40	F	80	S	58	L	33	R
19	Czech Republic	57	S	58	I	57	M	74	S	70	L	29	R

SN	Country (Region)	PD	Code	IC	Code	FM	Code	UA	Code	LS	Code	IR	Code
20	Denmark	18	S	74	I	16	F	23	W	35	S	70	I
21	Dominican Republic	65	S	30	C	65	M	45	W	13	S	54	I
22	Ecuador	78	L	8	C	63	M	67	S	NA	NA	NA	NA
23	Egypt	70	L	25	C	45	F	80	S	7	S	4	R
24	El Salvador	66	L	19	C	40	F	94	S	20	S	89	I
25	Estonia	40	S	60	I	30	F	60	W	82	L	16	R
26	Ethiopia	70	L	20	C	65	M	55	W	NA	NA	NA	NA
27	Fiji	78	L	14	C	46	F	48	W	NA	NA	NA	NA
28	Finland	33	S	63	I	26	F	59	W	38	S	57	I
29	France	68	L	71	I	43	F	86	S	63	L	48	I
30	Germany	35	S	67	I	66	M	65	S	83	L	40	R
31	Ghana	80	L	15	C	40	F	65	S	4	S	72	I
32	Greece	60	S	35	C	57	M	100	S	45	L	50	**I=50**
33	Guatemala	95	L	6	C	37	F	99	S	NA	NA	NA	NA
34	Honduras	80	L	20	C	40	F	50	W	NA	NA	NA	NA
35	Hong Kong	68	L	25	C	57	M	29	W	61	L	17	R
36	Hungary	46	S	80	I	88	M	82	S	58	L	31	R
37	Iceland	30	S	60	I	10	F	50	W	28	S	67	I
38	India	77	L	48	I	56	M	40	W	51	L	26	R
39	Indonesia	78	L	14	C	46	F	48	W	62	L	38	R
40	Iran	58	S	41	I	43	F	59	W	14	S	40	R
41	Iraq	95	L	30	**C=30**	70	M	85	S	25	S	17	R
42	Ireland	28	S	70	I	68	M	35	W	24	S	65	I
43	Israel	13	S	54	I	47	F	81	S	38	S	NA	NA
44	Italy	50	S	76	I	70	M	75	S	61	L	30	R

SN	Country (Region)	PD	Code	IC	Code	FM	Code	UA	Code	LS	Code	IR	Code
45	Jamaica	45	S	39	I	68	M	13	W	NA	NA	NA	NA
46	Japan	54	S	46	I	95	M	92	S	88	L	42	R
47	Jordan	70	L	30	C	45	F	65	S	16	S	43	R
48	Kenya	70	L	25	C	60	M	50	W	NA	NA	NA	NA
49	Kuwait	90	L	25	C	40	F	80	S	NA	NA	NA	NA
50	Latvia	44	S	70	I	9	F	63	W	69	L	13	R
51	Lebanon	75	L	40	I	65	M	50	W	14	S	25	R
52	Libya	80	L	38	C	52	M	68	S	23	S	34	R
53	Lithuania	42	S	60	I	19	F	65	**S=65**	82	L	16	R
54	Luxembourg	40	S	60	I	50	M	70	S	64	L	56	I
55	Malawi	70	L	30	C	40	F	50	W	NA	NA	NA	NA
56	Malaysia	100	L	26	C	50	M	36	W	41	S	57	I
57	Malta	56	S	59	I	47	F	96	S	47	L	66	I
58	Mexico	81	L	30	C	69	M	82	S	24	S	97	I
59	Morocco	70	L	46	I	53	M	68	S	14	S	25	R
60	Mozambique	85	L	15	C	38	F	44	W	11	S	80	I
61	Namibia	65	S	30	C	40	F	45	W	35	S	NA	NA
62	Nepal	65	S	30	C	40	F	40	W	NA	NA	NA	NA
63	Netherlands	38	S	80	I	14	F	53	W	67	L	68	I
64	New Zealand	22	S	79	I	58	M	49	W	33	S	75	I
65	Nigeria	80	L	30	C	60	M	55	W	13	S	84	I
66	Norway	31	S	69	I	8	F	50	W	35	S	55	I
67	Pakistan	55	S	14	C	50	**M=50**	70	S	50	L	0	R
68	Panama	95	L	11	C	44	F	86	S	NA	NA	NA	NA
69	Peru	64	S	16	C	42	F	87	S	25	S	46	R

SN	Country (Region)	PD	Code	IC	Code	FM	Code	UA	Code	LS	Code	IR	Code
70	Philippines	94	L	32	C	64	M	44	W	27	S	42	R
71	Poland	68	L	60	I	64	M	93	S	38	**S=38**	29	R
72	Portugal	63	S	27	C	31	F	99	S	28	S	32	R
73	Puerto Rico	68	L	27	C	56	M	38	W	19	S	99	I
74	Qatar	93	L	25	C	55	M	80	S	NA	NA	NA	NA
75	Romania	90	L	30	C	42	F	90	S	52	L	20	R
76	Russia	93	L	39	I	36	F	95	S	81	L	20	R
77	Saudi Arabia	95	L	25	C	60	M	80	S	36	S	52	I
78	Senegal	70	L	25	C	45	F	55	W	25	S	NA	NA
79	Serbia	86	L	25	C	43	F	92	S	52	L	28	R
80	Sierra Leone	70	L	20	C	40	F	50	W	NA	NA	NA	NA
81	Singapore	74	L	20	C	48	M	8	W	72	L	46	R
82	Slovakia	100	L	52	I	100	M	51	W	77	L	28	R
83	Slovenia	71	L	27	C	19	F	88	S	49	L	48	I
84	South Africa	49	S	65	I	63	M	49	W	34	S	63	I
85	South Korea	60	S	18	C	39	F	85	S	100	L	29	R
86	Spain	57	S	51	I	42	F	86	S	48	L	44	R
87	Sri Lanka	80	L	35	C	10	F	45	W	45	L	NA	NA
88	Suriname	85	L	47	I	37	F	92	S	NA	NA	NA	NA
89	Sweden	31	S	71	I	5	F	29	W	53	L	78	I
90	Switzerland	34	S	68	I	70	M	58	W	74	L	66	I
91	Syria	80	L	35	C	52	M	60	W	30	S	NA	NA
92	Taiwan (China)	58	S	17	C	45	F	69	S	93	L	49	I
93	Tanzania	70	L	25	C	40	F	50	W	34	S	38	R
94	Thailand	64	S	20	C	34	F	64	W	32	S	45	R

SN	Country (Region)	PD	Code	IC	Code	FM	Code	UA	Code	LS	Code	IR	Code
95	Trinidad and Tobago	47	S	16	C	58	M	55	W	13	S	80	I
96	Turkey	66	L	37	C	45	F	85	S	46	L	49	I
97	Ukraine	92	L	25	C	27	F	95	S	55	L	18	R
98	United Arab Emirates	90	L	25	C	50	M	80	S	NA	NA	NA	NA
99	United Kingdom	35	S	89	I	66	M	35	W	51	L	69	I
100	United States	40	S	91	I	62	M	46	W	26	S	68	I
101	Uruguay	61	S	36	C	38	F	99	S	26	S	53	I
102	Venezuela	81	L	12	C	73	M	76	S	16	S	100	I
103	Vietnam	70	L	20	C	40	F	30	W	57	L	35	R
104	Zambia	60	S	35	C	40	F	50	W	30	S	42	R
	Mean value	64.59	Mean value	38.62	Mean value	47.58		64.11	Mean value	42.93	Mean value	47.99	

Note: PD: power distance; IC: individualism versus collectivism; FM: femininity versus masculinity; UA: uncertainty avoidance; LS: long-term orientation versus short-term orientation; IR: indulgence versus restrained culture

The value of each country (region) was received from www.hofstede-insights.com/product/compare-countries/

Appendix II: Effect size transformation

Appendix II-i: Converting t-value to effect sizes

Several test statistics, such as t-statistics, Chi-square, F-test score, p-values, and Z-statistics, can be converted into *r* correlations. In this research, nine studies reported t-statistic while other statistics were not found. Then formulas from previous studies (Rosenthal, 1991) was adopted to transform t-statistics into correlation coefficients.

$$ESr=\frac{t}{\sqrt{t^2+df}}$$

Appendix II-ii: Combining effect sizes across studies

Many studies reported more than one correlation coefficient from multiple measures. For instance, Lee, *et al*. (2012) adopted trust, collaboration, and learning to measure the KFOC and reported three correlation coefficients. In such cases, the mean effect size of the three correlation coefficients was combined with the methods proposed by (Noel and Todd, 2012; Rosenthal, 1991; Shadish and Haddock 1994).

At first, Z-values (ESz_r) of each correlation coefficient (r) was standardized by:

$ESz_r = 0.5\log_e[\frac{1+r}{1-r}]$, (Lim *et al*., 2011);

Then, the mean Z_r effect size was calculated by the following equation:

$\overline{ESzr} = \frac{\sum(WZr*ESzr)}{WZr}$, wz_r= n-3, n is the sample size for each study (Lim *et al*., 2011);

Finally, the standardized correlation was converted back from mean Zr as follows:

$\overline{ESr} = \frac{e^{2\overline{ESZr}}-1}{e^{2\overline{ESZr}}+1}$, (Lim *et al*., 2011).

Appendix III: Strategic KM and organisational performance

Appendix III-i: Main effects of strategic KM and overall organisational performance

Table 1: Descriptive statistics of studies (strategic KM-overall organisational performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Fong and Chen, 2012-OP	0.4	149	China	L	C	M	W	L	R	Developing	Service
2	Kamhawi, 2012-OP	0.32	167	Bahraini	NA	NA	NA	NA	NA	NA	Developing	Multiple
3	Pee *et al.*, 2010-OP	0.38	101	Singapore	L	C	M	W	L	R	Developing	Service

Main effect size: r= 0.364, 95% CI: 0.277, 0.445, Z-value= 7.696, p < 0.001.

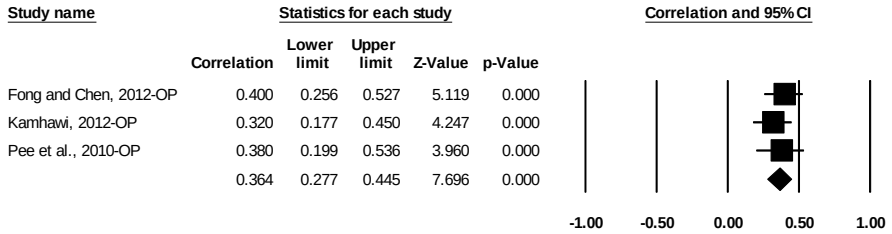

Figure 1: Forest plot of the strategic KM-overall organisational performance relationship

Appendix III-ii: Main effects of strategic KM and non-financial performance

Table 2: Descriptive statistics of studies (strategic KM-non-financial performance)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Kianto and Andreeva, 2014-NF-M	0.513	175	NA	NA	NA	NA	NA	NA	NA	NA	Manufacturing
2	Kianto and Andreeva, 2014-NF-S	0.391	120	NA	NA	NA	NA	NA	NA	NA	NA	Service
3	Migdadi, 2009-NF	0.092	418	Saudi Arabia	L	C	M	S	S	I	Developing	Unclear
4	Sucahyo *et al*. 2016-NF	0.494	139	Indonesia	L	C	F	W	L	R	Developing	Unclear

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
5	Tan and Wong, 2015-NF	0.702	206	Malaysia	L	C	M	W	S	I	Developing	Manufacturing

Main effect size: r= 0.458; 95% CI: 0.192, 0.662, Z-value= 3.222, p < 0.001.

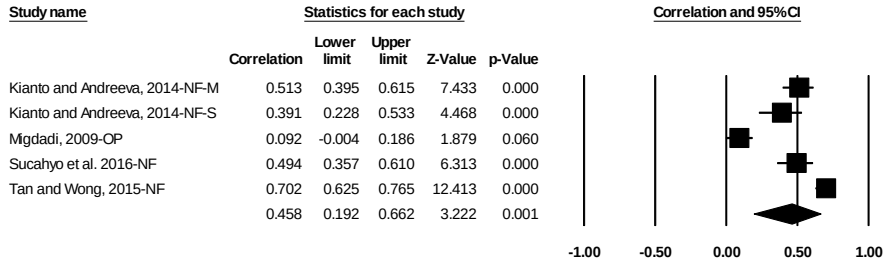

Figure 2: Forest plot of the strategic KM-non-financial performance relationship

Appendix IV: KM strategies and organisational performance

Appendix IV-i: Knowledge codification strategy and non-financial performance

Table 3: Descriptive statistics of studies (the codification strategy-non-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Bavarsad *et al*., 2015-C-NF	-0.022	180	Iran	S	I	F	W	S	R	Developing	Service
2	Cohen and Olsen, 2015-C-NF	0.387	112	South Africa	S	I	M	W	S	I	Developing	Service
3	Kim *et al*., 2014-C-NF	0.327	141	Korea	S	C	F	S	L	R	Developing	Multiple

Main effect size: r= 0.233; 95% CI: -0.035, 0.471, Z-value= 1.705, p < 0.088; this result showed that the relationships the codification strategy was not related to non-financial performance.

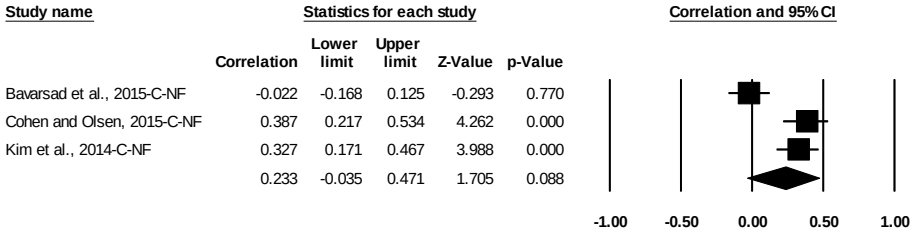

Figure 3: Forest plot of the codification strategy-non-financial performance relationship

Appendix IV-ii: Knowledge personalisation strategy and financial performance

Table 4: Descriptive statistics of studies (the personalisation strategy-financial performance relationship)

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
1	Chen and Huang, 2014-P-F	0.440	161	Taiwan (China)	S	C	F	S	L	I	Developing	Manufacturing
2	Ling, 2013-P-F	0.235	146	Taiwan (China)	S	C	F	S	L	I	Developing	Multiple
3	Marouf, 2016-P-F	0.420	392	Kuwait	L	C	F	S	NA	NA	Developing	Unclear

SN	Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
4	Sánchez *et al*., 2015-P-F	0.225	191	Spain	S	I	F	S	L	R	Developed	Multiple

Main effect size: r= 0.339; 95% CI: 0.222, 0.448, Z-value= 5.437, p < 0.000

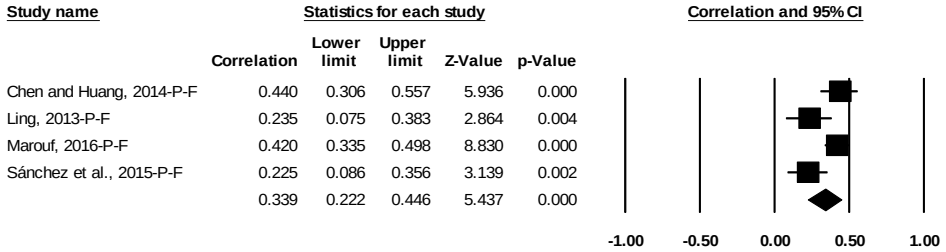

Figure 4: Forest plot of the personalisation strategy-financial performance relationship

Appendix IV-iii: Knowledge personalisation strategy and non-financial performance

Only two studies were found on the personalisation strategy-non-financial performance relationship, which is not enough for the meta-analysis.

Table 5: Descriptive statistics of studies (the personalisation strategy-non-financial performance relationship)

Study name	Effect size	Sample size	Region	PD	IC	FM	UA	LS	IR	Economy	Industry
Bavarsad *et al*., 2015-P-NF	-0.019	180	Iran	S	I	F	W	S	R	Developing	Unknown
Kim *et al*., 2014-P-NF	0.522	141	Korea	S	C	F	S	L	R	Developing	Unclear

Appendix V: Moderating effects of contextual factors

This section shows the insignificant empirical statistics of the moderating effect analysis.

Appendix V-i: Moderating effects of national culture

This section shows the insignificant empirical statistics of the moderating effect analysis for the national culture on the KM practices-organisational performance relationships.

Table 6: Categorical moderator test of the national culture (the KFOC-financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	3	0.560	0.080	0.829	2.244	0.025	Not supported H_{PDa2} [1]
Power distance (S)	9	0.263	0.119	0.396	3.528	0.000	
Total between	$Q_{between}$: 1.547; df(Q):1; p-value: 0.214						
Collectivism (C)	8	0.358	0.062	0.596	2.350	0.019	Not supported H_{ICa2} [1]
Individualism (I)	4	0.329	0.079	0.540	2.553	0.011	
Total between	$Q_{between}$: 0.025; df(Q):1; p-value: 0.876						
Femininity (F)	9	0.337	0.077	0.555	2.510	0.012	Not supported H_{FMa2} [1]
Masculinity (M)	3	0.386	0.076	0.628	2.408	0.016	
Total between	$Q_{between}$: 0.065; df(Q):1; p-value: 0.799						
Uncertainty avoidance (S)	8	0.359	0.060	0.600	2.331	0.020	Not supported H_{UAa2} [1]
Uncertainty avoidance (W)	4	0.328	0.065	0.549	2.424	0.015	
Total between	$Q_{between}$: 0.027; df(Q):1; p-value: 0.869						
Long-term orientation (L)	8	0.317	0.115	0.494	3.017	0.003	Not supported H_{LSa2} [1, 2]
Short-term orientation (S)	3	0.199	0.101	0.294	3.919	0.000	
Total between	$Q_{between}$: 1.099; df(Q):1; p-value: 0.295						
Indulgence (I)	8	0.215	0.109	0.315	3.943	0.000	Not supported H_{IRa2} [1,2]
Restrained (R)	3	0.449	0.022	0.737	2.055	0.040	
Total between	$Q_{between}$: 1.206; df(Q):1; p-value: 0.272						

Note: [1] The study of Kianto and Andreeva (2014) and [2] Marouf (2016) were excluded.

Table 7: Categorical moderator test national culture (the KFOC-non-financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	6	0.442	0.244	0.604	4.133	0.000	Not supported H_{PDa3} [1]
Power distance (S)	16	0.447	0.354	0.531	8.514	0.000	
Total between	$Q_{between}$: 0.003; df(Q):1; p-value: 0.959						
Collectivism (C)	12	0.459	0.337	0.566	6.671	0.000	Not supported H_{ICa3} [1]
Individualism (I)	10	0.429	0.309	0.537	6.418	0.000	
Total between	$Q_{between}$: 0.128; df(Q):1; p-value: 0.721						
Femininity (F)	12	0.417	0.315	0.509	7.416	0.000	Not supported H_{FMa3} [1]
Masculinity (M)	10	0.478	0.344	0.593	6.324	0.000	
Total between	$Q_{between}$: 0.568; df(Q):1; p-value: 0.451						
Uncertainty avoidance (S)	13	0.420	0.323	0.509	7.762	0.000	Not supported H_{UAa3} [1]
Uncertainty avoidance (W)	9	0.479	0.337	0.600	5.989	0.000	
Total between	$Q_{between}$: 0.500; df(Q):1; p-value: 0.480						
Long-term orientation (L)	13	0.437	0.341	0.523	8.150	0.000	Not supported H_{LSa3} [1, 2]
Short-term orientation (S)	7	0.431	0.270	0.568	4.916	0.000	
Total between	$Q_{between}$: 0.004; df(Q):1; p-value: 0.949						
Indulgence (I)	10	0.419	0.291	0.532	5.972	0.000	

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Restrained (R)	10	0.451	0.340	0.550	7.236	0.000	Not supported H_{IRa3} [1,2]
Total between	$Q_{between}$: 0.161; df(Q):1; p-value: 0.688						

Note: [1] The study of Kianto and Andreeva (2014), [2] Boumarafi and Jabnoun (2008), Mills and Smith (2011) were excluded.

Table 8: Categorical moderator test of the national culture (the knowledge-based leadership-overall organisational performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	4	0.449	0.338	0.547	7.233	0.0000	Not supported H_{PDb1} [1]
Power distance (S)	5	0.410	0.345	0.471	11.221	0.0000	
Total between	$Q_{between}$: 0.380; df(Q):1; p-value: 0.538						
Collectivism (C)	4	0.453	0.347	0.547	7.579	0.000	Not supported H_{ICb1} [1]
Individualism (I)	5	0.407	0.342	0.468	11.185	0.000	
Total between	$Q_{between}$: 0.559; df(Q):1; p-value: 0.455						
Femininity (F)	3	0.455	0.387	0.517	11.760	0.000	Not supported H_{FMb1} [1]
Masculinity (M)	6	0.412	0.331	0.486	9.207	0.000	
Total between	$Q_{between}$: 0.702; df(Q):1; p-value: 0.402						
Uncertainty avoidance (S)	2	0.400	0.238	0.540	4.588	0.000	Not supported H_{UAb1} [1]
Uncertainty avoidance (W)	7	0.434	0.367	0.496	11.468	0.000	
Total between	$Q_{between}$: 0.166; df(Q):1; p-value: 0.683						
Long-term orientation (L)	3	0.448	0.379	0.512	11.329	0.000	Not supported H_{LSb1} [1,2]
Short-term orientation (S)	5	0.435	0.347	0.516	8.723	0.000	
Total between	$Q_{between}$: 0.049; df(Q):1; p-value: 0.824						
Indulgence (I)	4	0.430	0.332	0.519	7.861	0.000	Not supported H_{IRb1} [1, 2]
Restrained (R)	4	0.444	0.379	0.505	11.900	0.000	
Total between	$Q_{between}$: 0.056; df(Q):1; p-value: 0.812						

Note: [1] The study of Kamhawi (2012) and [2] Boumarafi and Jabnoun (2008) were excluded.

Table 9: Categorical moderator test of the national culture (the knowledge-based leadership financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	2	0.245	0.137	0.348	4.362	0.000	Not supported H_{PDb2}
Power distance (S)	3	0.295	-0.061	0.585	1.631	0.103	
Total between	$Q_{between}$: 0.077; df(Q):1; p-value: 0.781						
Collectivism (C)	3	0.169	0.010	0.320	2.077	0.038	Not supported H_{ICb2}
Individualism (I)	2	0.419	0.065	0.679	2.297	0.022	
Total between	$Q_{between}$: 1.706; df(Q):1; p-value: 0.192						
Femininity (F)	5	NA	NA	NA	NA	NA	Not applicable H_{FMb2}
Masculinity (M)	0	NA	NA	NA	NA	NA	
Total between	NA						
Uncertainty avoidance (S)	3	0.291	-0.086	0.594	1.522	0.128	Not supported H_{UAb2}
Uncertainty avoidance (W)	2	0.253	0.155	0.345	4.982	0.000	
Total between	$Q_{between}$: 0.040; df(Q):1; p-value: 0.841						
Long-term orientation (L)	4	0.286	-0.004	0.532	1.935	0.053	Not supported H_{LSb2}
Short-term orientation (S)	1	0.245	0.127	0.356	4.017	0.000	
Total between	$Q_{between}$: 0.073; df(Q):1; p-value: 0.787						
Indulgence (I)	2	0.239	0.150	0.324	5.151	0.000	Not supported H_{IRb2}
Restrained (R)	3	0.304	-0.093	0.617	1.512	0.131	
Total between	$Q_{between}$: 0.109; df(Q):1; p-value: 0.742						

Table 10: Categorical moderator test of national culture (the strategic KM-financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	2	0.288	-0.130	0.618	1.361	0.174	Not supported H_{PDc2} [1]
Power distance (S)	5	0.176	0.067	0.281	3.156	0.002	
Total between	$Q_{between}$: 0.275; df(Q):1; p-value: 0.600						
Collectivism (C)	3	0.185	-0.120	0.459	1.193	0.233	Not supported H_{ICc2} [1]
Individualism (I)	4	0.214	0.133	0.293	5.074	0.000	
Total between	$Q_{between}$: 0.034; df(Q):1; p-value: 0.854						
Femininity (F)	6	0.209	0.078	0.332	3.111	0.002	Not supported H_{FMc2} [1]
Masculinity (M)	1	0.201	0.013	0.376	2.088	0.037	
Total between	$Q_{between}$: 0.004; df(Q):1; p-value: 0.947						
Uncertainty avoidance (S)	3	0.272	-0.053	0.545	1.647	0.100	Not supported H_{UAc2} [1]
Uncertainty avoidance (W)	4	0.173	0.108	0.236	5.156	0.000	
Total between	$Q_{between}$: 0.365; df(Q):1; p-value: 0.546						
Long-term orientation (L)	4	0.224	-0.016	0.440	1.828	0.068	Not supported H_{LSc2} [1]
Short-term orientation (S)	3	0.186	0.117	0.254	5.198	0.000	
Total between	$Q_{between}$: 0.090; df(Q):1; p-value: 0.764						
Indulgence (I)	3	0.186	0.117	0.254	5.198	0.000	Not supported H_{IRc2} [1]
Restrained (R)	4	0.224	-0.016	0.440	1.828	0.068	
Total between	$Q_{between}$: 0.090; df(Q):1; p-value: 0.764						

Note: [1] The study of Kianto and Andreeva (2014) was excluded.

Table 11: Categorical moderator test of national culture (the knowledge personalisation strategy-overall organisational performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	2	0.376	0.273	0.471	6.693	0.000	Not supported H_{PDdp1}
Power distance (S)	3	0.082	-0.048	0.210	1.239	0.215	
Total between	$Q_{between}$: 12.368; df(Q):1; p-value: 0.000						
Collectivism (C)	4	0.169	-0.018	0.344	1.772	0.076	Not supported H_{ICdp1}
Individualism (I)	1	0.375	0.193	0.532	3.883	0.000	
Total between	$Q_{between}$: 2.569; df(Q):1; p-value: 0.109						
Femininity (F)	3	0.210	-0.050	0.443	1.589	0.112	Not supported H_{FMdp1}
Masculinity (M)	2	0.211	-0.121	0.501	1.251	0.211	
Total between	$Q_{between}$: 0.000; df(Q):1; p-value: 0.995						
Uncertainty avoidance (S)	3	0.082	-0.048	0.210	1.239	0.215	Not supported H_{UAdp1}
Uncertainty avoidance (W)	2	0.376	0.273	0.471	6.693	0.000	
Total between	$Q_{between}$: 12.368; df(Q):1; p-value: 0.000						
Long-term orientation (L)	6	NA	NA	NA	NA	NA	Not applicable H_{LSdp1}
Short-term orientation (S)	NA	NA	NA	NA	NA	NA	
Total between	$Q_{between}$: NA						
Indulgence (I)	1	0.250	0.067	0.417	2.654	0.008	Not supported H_{IRdp1}
Restrained (R)	4	0.200	-0.007	0.390	1.890	0.059	
Total between	$Q_{between}$: 0.136; df(Q):1; p-value: 0.713						

Table 12: Categorical moderator test of national culture (the KM-supportive IT-overall organisational performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	12	0.478	0.146	0.714	2.727	0.006	Not supported H_{PDe1} [1]
Power distance (S)	7	0.389	0.196	0.553	3.795	0.000	
Total between	$Q_{between}$: 0.250; df(Q):1; p-value: 0.617						
Collectivism (C)	13	0.487	0.169	0.714	2.882	0.004	

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Individualism (I)	6	0.354	0.167	0.518	3.587	0.000	Not supported H_{ICe1} [1]
Total between	$Q_{between}$: 0.585; df(Q):1; p-value: 0.444						
Femininity (F)	5	0.376	0.071	0.617	2.387	0.017	Not supported H_{FMe1} [1]
Masculinity (M)	14	0.470	0.220	0.662	3.490	0.001	
Total between	$Q_{between}$: 0.272; df(Q):1; p-value: 0.602						
Uncertainty avoidance (S)	7	0.577	0.031	0.858	2.058	0.040	Not supported H_{UAe1} [1]
Uncertainty avoidance (W)	12	0.362	0.187	0.514	3.907	0.000	
Total between	$Q_{between}$: 0.698; df(Q):1; p-value: 0.404						
Long-term orientation (L)	13	0.419	0.247	0.565	4.517	0.000	Not supported H_{LSe1} [1, 2]
Short-term orientation (S)	5	0.547	-0.050	0.856	1.813	0.070	
Total between	$Q_{between}$: 0.227; df(Q):1; p-value: 0.634						
Indulgence (I)	7	0.589	0.184	0.823	2.703	0.007	Not supported H_{IRe1} [1,2,3]
Restrained (R)	10	0.367	0.126	0.568	2.920	0.004	
Total between	$Q_{between}$: 1.060; df(Q):1; p-value: 0.303						

Note: [1] The study of Kamhawi (2012) [2] Boumarafi and Jabnoun (2008) and [3] Kroh *et al*., (2018) were excluded.

Table 13: Categorical moderator test of national culture (the KM-supportive IT-financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	3	0.433	0.041	0.709	2.149	0.032	Not supported H_{PDe2} [1]
Power distance (S)	9	0.327	0.197	0.445	4.774	0.000	
Total between	$Q_{between}$: 0.299; df(Q):1; p-value: 0.585						
Collectivism (C)	6	0.447	0.215	0.631	3.587	0.000	Not supported H_{ICe2} [1]
Individualism (I)	6	0.250	0.156	0.340	5.090	0.000	
Total between	$Q_{between}$: 2.477; df(Q):1; p-value: 0.116						
Femininity (F)	8	0.315	0.155	0.459	3.759	0.000	Not supported H_{FMe2} [1]
Masculinity (M)	4	0.432	0.169	0.638	3.107	0.002	
Total between	$Q_{between}$: 0.632; df(Q):1; p-value: 0.427						
Uncertainty avoidance (S)	7	0.429	0.221	0.599	3.838	0.000	Not supported H_{UAe2}[1]
Uncertainty avoidance (W)	5	0.243	0.130	0.350	4.139	0.000	
Total between	$Q_{between}$: 2.482; df(Q):1; p-value: 0.115						
Long-term orientation (L)	6	0.375	0.185	0.538	3.732	0.000	Not supported H_{LSe2} [1]
Short-term orientation (S)	6	0.339	0.120	0.527	2.976	0.003	
Total between	$Q_{between}$: 0.068; df(Q):1; p-value: 0.794						
Indulgence (I)	8	0.377	0.175	0.549	3.536	0.000	Not supported H_{IRe2} [1]
Restrained (R)	4	0.312	0.236	0.384	7.722	0.000	
Total between	$Q_{between}$: 0.382; df(Q):1; p-value: 0.537						

Note: [1] The study of Kianto and Andreeva (2014) was excluded

Table 14: Categorical moderator test of national culture (the KM-supportive IT-non-financial performance relationship)

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Power distance (L)	6	0.448	0.209	0.636	3.506	0.000	Not supported H_{PDe3} [2]
Power distance (S)	11	0.449	0.340	0.546	7.345	0.000	
Total between	$Q_{between}$: 0.000; df(Q):1; p-value: 0.990						
Collectivism (C)	12	0.427	0.296	0.543	5.897	0.000	Not supported H_{ICe3} [2, 3]
Individualism (I)	4	0.416	0.286	0.532	5.828	0.000	
Total between	$Q_{between}$: 0.015; df(Q):1; p-value: 0.904						
Femininity (F)	7	0.399	0.305	0.485	7.729	0.000	

National culture dimension	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Masculinity (M)	9	0.439	0.289	0.569	5.300	0.000	Not supported H_{FMe3} [2, 3]
Total between	$Q_{between}$: 0.221; df(Q):1; p-value: 0.638						
Uncertainty avoidance (S)	9	0.493	0.365	0.603	6.696	0.000	Not supported H_{UAe3} [2]
Uncertainty avoidance (W)	8	0.397	0.235	0.537	4.565	0.000	
Total between	$Q_{between}$: 0.967; df(Q):1; p-value: 0.326						
Long-term orientation (L)	8	0.459	0.307	0.588	5.425	0.000	Not supported H_{LSe3} [1,2]
Short-term orientation (S)	7	0.405	0.218	0.563	4.050	0.000	
Total between	$Q_{between}$: 0.225; df(Q):1; p-value: 0.635						
Indulgence (I)	11	0.391	0.256	0.511	5.361	0.000	Not supported H_{IRe3} [1, 2, 3]
Restrained (R)	3	0.448	0.371	0.518	10.222	0.000	
Total between	$Q_{between}$: 0.574; df(Q):1; p-value: 0.449						

Note: [1] The study of Boumarafi and Jabnoun (2008), Mills and Smith (2011), [2] Kianto and Andreeva (2014), and [3] Liang *et al*. (2013) were excluded.

Appendix V-ii: Moderating effects of the national economy

This section shows the insignificant empirical statistics of the moderating effect analysis for the national economy on the KM practices-organisational performance relationships.

Table 15: Categorical moderator test of economies (the KFOC- overall organisational performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	7	0.369	0.254	0.474	5.944	0.000	Not supported H_{Ea1}
Developing economies	23	0.458	0.360	0.546	8.238	0.000	
Total between	$Q_{between}$: 1.466; df(Q):1; p-value: 0.226						

Table 16: Categorical moderator test of economies (the KFOC-financial performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	4	0.329	0.079	0.540	2.553	0.011	Not supported H_{Ea2} [1]
Developing economies	8	0.358	0.062	0.596	2.350	0.019	
Total between	$Q_{between}$: 0.025; df(Q):1; p-value: 0.876						

Note: [1] The study of Kianto and Andreeva (2014) was excluded.

Table 17: Categorical moderator test of economies (KFOC-non-financial performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	7	0.356	0.212	0.486	4.639	0.000	Not supported H_{Ea3} [1]
Developing economies	15	0.484	0.383	0.574	8.261	0.000	
Total between	$Q_{between}$: 2.302; df(Q):1; p-value: 0.129						

Note: [1] The study of Kianto and Andreeva (2014) was excluded

Table 18: Categorical moderator test of economies (the knowledge-based leadership-overall organisational performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	2	0.356	0.225	0.474	5.086	0.000	Not supported H_{Eb1}
Developing economies	8	0.443	0.383	0.500	12.799	0.000	
Total between	$Q_{between}$: 1.608; df(Q):1; p-value: 0.205						

Table 19: Categorical moderator test of economies (the knowledge-based leadership-financial performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	2	0.419	0.065	0.679	2.297	0.022	Not supported H_{Eb2}
Developing economies	3	0.169	0.010	0.320	2.077	0.038	
Total between	$Q_{between}$: 1.706; df(Q):1; p-value: 0.192						

Table 20: Categorical moderator test of economies (the strategic KM-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	4	0.214	0.133	0.293	5.074	0.000	Not supported H_{Ec2}[1]
Developing economies	2	0.020	-0.093	0.133	0.348	0.728	
Total between	$Q_{between}$: 7.496; df(Q):1; p-value: 0.006						

Note: [1] The study of Kianto and Andreeva (2014) and Cabrilo and Dahms (2018) were excluded.

Table 21: Categorical moderator test of economies (the knowledge codification strategy-financial performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	1	0.128	-0.014	0.265	1.765	0.078	Not supported H_{Edc2}
Developing economies	4	0.318	0.241	0.392	7.646	0.000	
Total between	$Q_{between}$: 5.639; df(Q):1; p-value: 0.018						

Table 22: Categorical moderator test of economies (the KM-supportive IT-overall organisational performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	2	0.423	0.112	0.658	2.610	0.009	Not supported H_{Ee1}
Developing economies	18	0.442	0.192	0.639	3.317	0.001	
Total between	$Q_{between}$: 0.011; df(Q):1; p-value: 0.915						

Table 23: Categorical moderator test of economies (the KM-supportive IT-non-financial performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	2	0.390	0.328	0.448	11.420	0.000	Not supported H_{Ee3} [2, 3]
Developing economies	14	0.426	0.309	0.531	6.542	0.000	
Total between	$Q_{between}$: 0.319; df(Q):1; p-value: 0.572						

Note: [2] The study of Kianto and Andreeva (2014) and [3] Liang et al. (2013) were excluded.

Table 24: Categorical moderator test of economies (the organisational learning-overall organisational performance relationship)

Economies	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	6	0.428	0.217	0.600	3.793	0.000	Not supported H_{Ef1}
Developing economies	14	0.466	0.322	0.588	5.803	0.000	
Total between	$Q_{between}$: 0.102; df(Q):1; p-value: 0.750						

Table 25: Categorical moderator test of economies (the organisational learning-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Developed economies	11	0.274	0.173	0.369	5.193	0.000	Not supported H_{Ef2} [1]
Developing economies	8	0.309	0.135	0.464	3.420	0.001	
Total between	$Q_{between}$: 0.124; df(Q):1; p-value: 0.725						

Note: The study of Shirokova et al. (2013) was excluded as it collected data in a transition economy.

Appendix V-iii: Moderating effects of industry

This section shows the insignificant empirical statistics of the moderating effect analysis for the industry on the KM practices-organisational performance relationships. Studies collected data from multiple industries were excluded for the moderating testing.

Table 26: Categorical moderator test of industries (the KFOC- overall organisational performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	8	0.459	0.235	0.637	3.795	0.000	Not supported H_{Ia1}
Service	6	0.570	0.427	0.685	6.636	0.000	
Total between	$Q_{between}$: 0.855; df(Q):1; p-value: 0.355						

Table 27: Categorical moderator test of industries (the KFOC-non-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	7	0.467	0.334	0.582	6.232	0.000	Not supported H_{Ia3}
Service	6	0.312	0.135	0.470	3.384	0.001	
Total between	$Q_{between}$: 2.316; df(Q):1; p-value: 0. 144						

Note: [3] The study of Chong *et al.* (2011) and Migdadi *et al*. (2016) were excluded.

Table 28: Categorical moderator test of industries (the knowledge-based leadership-overall organisational performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	4	0.487	0.411	0.556	10.980	0.000	Not supported H_{Ib1}
Service	1	0.410	0.233	0.561	4.312	0.000	
Total between	$Q_{between}$: 0.740; df(Q):1; p-value: 0.390						

Table 29: Categorical moderator test of industries (the knowledge codification strategy-overall organisational performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	2	0.168	-0.489	0.704	0.473	0.636	Not supported H_{Idc1}
Service	2	0.431	0.307	0.541	6.260	0.000	
Total between	$Q_{between}$:0.630; df(Q):1; p-value: 0.427						

Table 30: Categorical moderator test of industries (the knowledge codification strategy-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	2	0.334	0.175	0.476	3.989	0.000	Not supported H_{Idc2}
Service	1	0.262	0.080	0.427	2.801	0.005	
Total between	$Q_{between}$: 0.371; df(Q):1; p-value: 0.542						

Table 31: Categorical moderator test of industries (the knowledge personalisation strategy-overall organisational performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	2	0.328	0.202	0.443	4.917	0.000	Not supported H_{Idp1}
Service	1	0.375	0.193	0.532	3.883	0.000	
Total between	$Q_{between}$:0.195; df(Q):1; p-value: 0.695						

Table 32: Categorical moderator test of industries (the KM-supportive IT-overall organisational performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	8	0.429	0.300	0.543	6.010	0.000	Not supported H_{Ie1} [4]
Service	4	0.474	0.042	0.756	2.135	0.033	
Total between	$Q_{between}$:0.050 ; df(Q):1; p-value: 0.824						

Note: [4] The study of Matin and Sabagh (2015) and Migdadi, (2009) were excluded

Table 33: Categorical moderator test of industries (the KM-supportive IT-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	4	0.367	0.115	0.575	2.803	0.005	Not supported H_{Ie2}
Service	3	0.361	0.255	0.458	6.328	0.000	
Total between	$Q_{between}$: 0.003; df(Q):1; p-value: 0.959						

Table 34: Categorical moderator test of industries (the KM-supportive IT-non-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	7	0.371	0.197	0.523	4.007	0.000	Not supported H_{Ie3} [3, 4, 5]
Service	3	0.350	0.223	0.465	5.170	0.000	
Total between	$Q_{between}$:0.043; df(Q):1; p-value: 0.836						

Note: [3] The study of Liang *et al*., 2013,[4] Chong *et al.* (2011), and [5] Sucahyo *et al*. (2016) were excluded.

Table 35: Categorical moderator test of industries (the organisational learning-overall organisational performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	8	0.477	0.281	0.634	4.424	0.000	Not supported H_{If1} [2]
Service	6	0.454	0.198	0.652	3.322	0.000	
Total between	$Q_{between}$: 0.025; df(Q):1; p-value: 0.875						

Note: [2] The study of Gantasala *et al.* (2010) was excluded

Table 36: Categorical moderator test of industries (the organisational learning-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	7	0.272	0.093	0.434	2.949	0.003	Not supported H_{If2} [2]
Service	2	0.161	-0.003	0.316	1.927	0.054	
Total between	$Q_{between}$: 0.851; df(Q):1; p-value: 0.356						

Note: [2] The study of García-Morales *et al.* (2007); Li, *et al*. (2011), Rhodes *et al.* (2008), and Wang and Fang (2011) were excluded

Table 37: Categorical moderator test of industries the organisational learning -non-financial performance relationship)

Industry type	Sample size	Effect size	95% CI		Two-tailed test		Result
			Lower limited	Upper limited	Z-value	p-value	
Manufacturing	4	0.226	0.152	0.298	5.830	0.000	Not supported H_{If3} [1]
Service	2	0.137	-0.111	0.369	1.087	0.277	
Total between	$Q_{between}$:0.476; df(Q):1; p-value: 0.490						

Note: [1] The study of Ngah *et al*. (2016) was excluded.