Linking knowledge management orientation to balanced scorecard outcomes

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Abstract

Purpose – *This study aims to develops the decomposed model to examine the influence of knowledge management orientation (KMO) dimensions (organizational memory, knowledge sharing, knowledge absorption and knowledge receptivity) on balanced scorecard outcomes (learning and growth, internal process, customer satisfaction and financial performance).*

Design/methodology/approach – *Survey data from 244 managers (in charge of KM projects in their companies) in large Taiwanese firms were collected and used to test the decomposed model using the structural equation modeling approach.*

Findings – *This study finds that knowledge sharing is the strongest predictor of internal process performance, while knowledge absorption is pivotal in improving customer satisfaction. The results also show that non-financial performance measures (i.e. learning and growth, internal process and customer satisfaction) directly and indirectly affect financial performance through cause-and-effect relationships.*

Practical implications – *In an increasingly dynamic environment, the building of internal knowledge stocks is likely insufficient, but knowledge must be moved between a firm and external entities (e.g. customers, business partners and education and research institutes) (i.e. building knowledge flows) to achieve increased customer satisfaction and financial performance.*

Originality/value – *Theoretically, the findings of this study suggest that the decomposed approach helps to understand the complex relationships embodied in the KMO–performance link, which cannot be surmised using a composite model. From the managerial perspective, the findings of this study may help academics and managers design and sustain KMO implementation throughout the organization to achieve higher effectiveness, efficiency and profitability.*

Keywords *Balanced scorecard, Performance indicators, Knowledge sharing, Knowledge management*

Paper type *Research paper*

1. Introduction

Because organizations are constantly under intense competition, globalization and innovation and time-to-market pressures, knowledge management (KM) and its application are considered an imperative for achieving business success (Zack *et al.*, 2009). KM is a set of procedures and managerial tools developed to capture, acquire, organize and communicate both tacit and explicit knowledge of employees so that other employees can utilize them to make their work more effective and productive and maximize organization knowledge (Xu and Quaddus, 2012). Developing and maintaining KM is vital to firm long-term survival and success. KM can gradually transform individual knowledge into group and organizational knowledge, in turn, improving the stock and flow of firm knowledge. Consequently, firms invest in KM particularly to accumulate business management experience and develop a sustainable competitive advantage (Chang and Lee, 2008; Mills and Smith, 2011).

In the information age, the concept of knowledge management orientation (KMO) has attracted enormous attention from KM academics and practitioners. This is unsurprising, as it is closely related to the fundamentals of firm knowledge base (Grant, 1996), with KMO

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implementation as an organizational-wide philosophy that creates economic, social, intellectual and cultural value (DeCarolis and Deeds, 1999; Zack *et al.*, 2009). KMO can be defined as the relative propensity of a firm to build on existing knowledge (organizational memory), as well as to share knowledge (knowledge sharing), assimilate external knowledge within the existing framework of internal knowledge (knowledge absorption) and be receptive to new knowledge (knowledge receptivity) (Wang *et al.*, 2008). Stankosky (2005) specifically stated that KMO implementation is a sequence of knowledge-based behaviors that most effectively and efficiently improve firm problem-solving capabilities, and thus that ensure firms are continuously more productive than its competitors. While the nature of the relationship between KMO and firm profitability has received substantial attention in the literature (Wang *et al.*, 2008, 2009; Wang and Lin, 2013), previous research has tended to bundle the dimensions of KMO. A clear model of the different forms of organizational performance (such as financial and non-financial performance) that individual KMO dimensions may significantly impact is lacking.

While understanding KMO implementation is important, business managers must also understand how to systematically examine its impact on performance improvement. Choy *et al.* (2006) argued that KMO implementation is an investment that needs resources, and where effort is required to measure its results. Measurable success is essential to continued enthusiasm and support for KMO implementation (Ranjit, 2004). Organizations traditionally have assessed performance based largely on financial indicator analysis. However, the financial indicator analysis does not relate to important organizational strategies and non-financial aspects of performance, such as learning, innovation, internal business process and customer value (Gonzalez-Padron *et al.*, 2010). Researchers have generally agreed that the evaluation of organizational performance through KM efforts is increasingly important, as it promotes organizational learning strategies and so fits with the requirement to meet financial and non-financial needs (Arora, 2002; Marr, 2004; Lee and Lee, 2007; Chen and Mohamed, 2008; Chen *et al.*, 2009a). The balanced scorecard approach involves balancing financial and non-financial measures and specifically looked at a business from four perspectives: learning and growth, internal process, customer and financial (Kaplan and Norton, 2004a, 2004b). The balanced scorecard may be a feasible approach for measuring the contribution of KM to performance improvement. The linking of individual KMO dimensions to balanced scorecard outcomes, thus, requires further investigating and understanding.

However, to the best of our knowledge, researchers rarely examine empirically exactly how individual KMO dimensions impact organizational performance based on the balanced scorecard approach. The central objective of this study is to propose the decomposed model to examine the influence of four dimensions of KMO, namely, organizational memory, knowledge sharing, knowledge absorption and knowledge receptivity, on balanced scorecard outcomes. The next objective is to explore and analyze the interrelationships among four balanced scorecard perspectives (learning and growth, internal process, customer satisfaction and financial performance) in the context of KMO implementation. Then this study tested the decomposed model and hypothesized relationships using survey data from 244 Taiwanese organizations. The data analysis was performed by structural equation modeling (SEM) approach. The results may help academics and managers design and sustain KMO implementation throughout the organization to achieve higher effectiveness, efficiency and profitability.

The reminder of this paper is organized as follows. First, the theoretical model is developed for explaining the relationship between KMO dimensions and the balanced scorecard outcomes. Then, the research design is outlined and results are reported. The paper concludes with a discussion of empirical findings, managerial implications and limitations and future research.

2. Literature review

2.1 Knowledge-based view and organizational sensemaking view

The study of relationships between individual KMO dimensions and balanced scorecard outcomes has been without substantial theoretical grounding. Yet, several preliminary theoretical works still provide us with insights into the KM-organizational performance. First, centered on the knowledge-based view, it is a widely applied paradigm to explain variance in firm competiveness across competing firms (DeCarolis and Deeds, 1999; Zack *et al.*, 2009; Zheng *et al.*, 2010). With its roots in the resource-based view of the firm, this theoretical perspective posits that superior firm performance derives from strategic assets (such as knowledge, competence and skill) that are valuable, rare, difficult to imitate and sustainable (Barney, 1991; Grant, 1996). From this perspective, it is recognized that firm abilities to exploit existing knowledge (knowledge stocks) and explore new knowledge (knowledge flows) are the main source of firm-sustainable competitive advantage (Foss, 2006; Prieto and Easterby-Smith, 2006). Knowledge stocks are described as the accumulation of knowledge within a firm, while knowledge flows represent the streams of knowledge that move within and between firms, and can be assimilated and transformed into stocks of knowledge (DeCarolis and Deeds, 1999; Dierickx and Cool, 1989).

Knowledge stocks refer to firm ability to utilize and store existing knowledge and organizational memory (Dierickx and Cool, 1989). The value of knowledge stocks is determined by the accumulated knowledge and skills of employees that enable a firm to accelerate internal innovation and respond to market needs (Chang and Lee, 2008; Johannessen *et al.*, 1999; Tiwana, 2004). Moreover, knowledge flows are crucial for strategic renewal of new knowledge, as well as firm ability to absorb and transfer useful knowledge among employees and across firm boundaries (Dierickx and Cool, 1989). Particularly in dynamic environments, the flow of knowledge both within and across firms is essential for innovation and continuous adaptation, which, in turn, increases the value of products or services, and thus market value (Darroch, 2005; Donate and Guadamillas, 2011; Jayasingam *et al.*, 2013; Nonaka and Takeuchi, 1995; Spender, 1996). From the above studies, it can be inferred that the development of knowledge stocks and knowledge flows facilitates organizational performance (both within and across organizations).

Second, based on the organizational sensemaking view, scholars suggest that organizational behaviors, both external-procedural (e.g. how a firm effectively manages knowledge) and internal-cognitive (e.g. an open-minded organizational culture), determine firm decision-making processes and ultimately improve organizational performance (Daft and Weick, 1984; Milliken, 1990; Neill *et al.*, 2007; Thomas *et al.*, 2001). Organizational sensemaking can be viewed as a set of mechanisms that shape what meaningful information is assimilated, how it is interpreted and which actions are considered (Thomas *et al.*, 1993; Weick *et al.*, 2005). As a capability, organizational sensemaking contributes to a firm's ability to build and sustain a competitive advantage (Bogner and Barr, 2000) by enhancing the ability to collect (through knowledge collection and storage), communicate (by knowledge exchange with colleagues), interpret (through assimilating external knowledge with internal and existing knowledge frame) and accept (by an open-minded receptivity to new and possibly different ideas) organizational knowledge (Neill *et al.*, 2007). Therefore, the organizational sensemaking view can be viewed as a complementary theoretical basis to create links between inside-out capabilities (such as KMO) and balanced scorecard outcomes.

2.2 Knowledge management orientation

KMO refers to the propensities and behaviors that help firms facilitate KM efforts involving organized and systematic knowledge accumulation and utilization (Wang *et al.*, 2009). KM scholars agree that KMO (required for storing, sharing, absorbing and accepting knowledge within and from outside the organization) is required for a firm to take advantage of emerging opportunities before rivals can recognize them (Cohen and Levinthal, 1990;

Davenport *et al.*, 1998; Gray, 2001; Huber, 1991; Hult, 2003; Nonaka and Takeuchi, 1995). Wang *et al.* (2008), thus, defined and measured KMO through four broad dimensions: organizational memory, knowledge sharing, knowledge absorption and knowledge receptivity.

2.2.1 Organizational memory. Organizational memory is broadly defined as the firm's ability to remember and learn from past experience by avoiding the repetition of past mistakes and adopting proven methods for achieving success (Day, 1994; Johnson and Paper, 1998). According to Walsh and Ungson (1991), organizational memory can be viewed as a method for acquiring, retaining and retrieving knowledge and making it accessible to help organizations realize their objectives. Organizational memory exists at both the individual and organizational levels. At the individual level, employees remember the events, rules, special skills and learning experiences required to perform their tasks in the work environment. At the organizational level, organizational memory often becomes embedded in documents, repositories, organizational routines and procedures and the values of the organizational culture (Argote, 1999; Davenport and Prusak, 1998; Pollitt, 2009). Regarding the technology-based perspective, several scholars have conceived organizational memory as building a knowledge repository (such as shared databases, knowledge bases or even the intranet) to capture individual knowledge and store that knowledge such that others can easily access it (Handzic, 2005; Wang *et al.*, 2003).

2.2.2 Knowledge sharing. Knowledge sharing refers to collective beliefs or behavioral routines related to exchanging employee knowledge, experiences and skills throughout a department or organization (Moorman and Miner, 1998). Previous research has discussed that knowledge sharing involves both the supply (disseminating or donating) and demand (collecting or receiving) for organizational knowledge (Ardichvili *et al.*, 2003; Van den Hooff and Van Weenen, 2004). Knowledge collecting can be defined as the process of consulting colleagues to encourage them to share their intellectual capital, while knowledge donating can be defined as the process of individuals communicating their personal intellectual capital to others. To cultivate a positive attitude to knowledge sharing among employees, organizations must provide support, resources and a clear mandate that encourage employees to share their knowledge with others. Because knowledge exists within different individuals and different levels of an organization, employees must share it to achieve and maintain strategic competitiveness (Nonaka and Takeuchi, 1995).

2.2.3 Knowledge absorption. Knowledge absorption is similar to the term "absorptive capacity", which refers to the organization identifying the value of external knowledge, and then assimilating and applying that knowledge (Cohen and Levinthal, 1990). Smith (1995) further specified that knowledge absorption is a set of organizational routines and processes through which employees assimilate knowledge from outside the firm, such as from market sources, business partners, education and research institutes and personnel flow. KM initiatives rely on absorbing external knowledge, including the employment of a professional workface, engagement in environmental scanning and collection of satisfaction data from organizational suppliers and customers, that improve continuous learning within the firm (Knudsen and Roman, 2004). Knowledge absorption can also be considered the foundation of firm competitive advantage because it can strengthen, complement or refocus the knowledge base of the firm (Zahra and George, 2002).

2.2.4 Knowledge receptivity. Knowledge receptivity means a positive disposition to new ideas, and it reflects the ease of the internal adoption of new ideas (Wang *et al.*, 2008). For organizations to create value, employees must have a positive attitude toward new knowledge (Davenport *et al.*, 1998). This positive attitude can involve several aspects, including employees being intellectually curious and willing to explore new ideas and consider their possible adoption and managers encouraging employees to contribute their new ideas without fear of repercussions. Therefore, Wang *et al.* (2008, p. 224) stated that: "knowledge receptivity as the extent to which a firm encourages ideas and evaluates them on a fair, effective, and regular basis, and subsequently incorporates them into business

practice". Research also suggested that knowledge receptivity is closely allied with the concept of issue orientation, the extent to which new ideas are judged based on their merit, unrelated to the identity and status of the contributor (Popper and Lipshitz, 1998).

2.3 Balanced scorecard outcomes

To ensure successful KMO implementation, organizations must measure the performance of its KM efforts (Bose, 2004). Performance evaluation methods in the KM literature can be divided into three broad groups: financial (tangible) performance (Goll *et al.*, 2007; Vaccaro *et al.*, 2010), innovation (intangible) performance (Andreeva and Kianto, 2012; Darroch, 2005; Ferraresi *et al.*, 2012; Rhodes *et al.*, 2008a, 2008b) and the balanced scorecard approach (Arora, 2002; Chen and Mohamed, 2008; Gonzalez-Padron *et al.*, 2010; Pietrantonio, 2007). As a cross-functional performance measurement framework, the balanced scorecard reflects how effectively an organization meets not only financial requirements but also the need to improve learning and innovation, internal process and customer service (Srivastava *et al.*, 1999). The balanced scorecard is a more useful measure than financial performance or innovation performance because it provides a comprehensive view of actual organizational performance (Kaplan and Norton, 2000; Lueg and Julner, 2014).

The balanced scorecard contains four perspective levels, namely, learning and growth, internal process, customer satisfaction and financial performance (Kaplan and Norton, 1996, 2004a, 2004b). Learning and growth looks at organization intangible assets, including employee skills and capabilities necessary to facilitate organizational growth and improvement. Internal process focuses on operation management and innovation processes that create and deliver business value. Customer satisfaction emphasizes the customer relationship and service delivery to customers. Financial performance emphasizes the tangible outcomes of the strategy using traditional financial terms, such as economic value added, revenue growth, return on investment and net benefit.

3. The decomposed model and hypotheses development

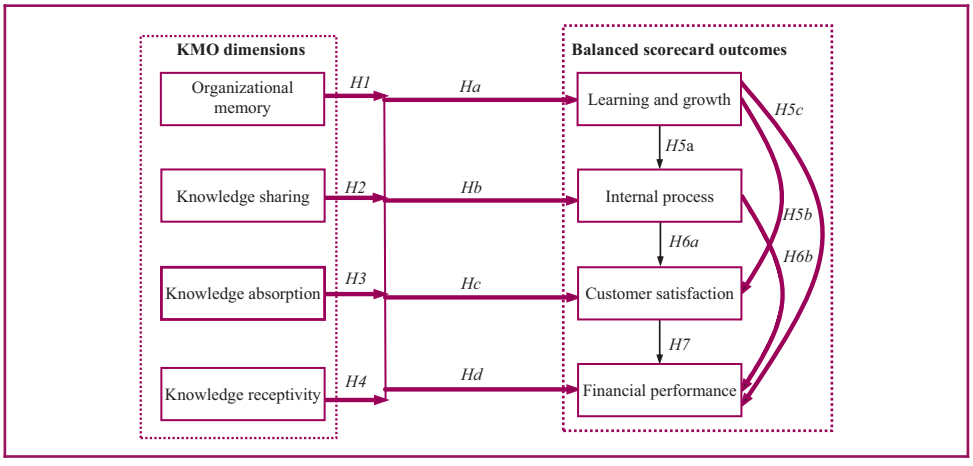
Based on the prior research, KM-organizational performance has been informed by three dominant theoretical perspectives. First, from the knowledge-based view, the development of knowledge stocks (i.e. stocks of organizational memory) and knowledge flows (including the transfer and absorption of knowledge within and outside the organization) influences not only internal firm governance but also external market success (Chang and Lee, 2008; Donate and Guadamillas, 2011; Jayasingam *et al.*, 2013). The second perspective pertains to the organizational sensemaking view. Firms with a developed sensemaking capability have the ability to rapidly understand, incorporate and assimilate new information, which directly and indirectly influences organizational performance (Thomas *et al.*, 1993). Third, according to Kaplan and Norton (1996, 2004a, 2004b), the balanced scorecard is a strategic management tool which provides feedback around both the internal business processes and external outcomes that continuously improve organizational performance. Because building a KM-oriented organizational environment is an activity that involves the whole organization, this study considered the balanced scorecard to be a more proper to measure organizational performance through the development of KMO.

Overall, the above discussion can be formulated as the decomposed model depicted in Figure 1. The model shows the relationship between KMO dimensions and balanced scorecard outcomes taking into account both direct and indirect effects.

3.1 Impact of KMO on balanced scorecard outcomes

An organization cannot solely rely on the knowledge embedded in individuals. As Hult (2003) suggests, organizational memory or knowledge repository must act as a mechanism for the organization to remember what previously worked and why, so that such knowledge

Figure 1 The decomposed model



can be applied in future decisions. Organizational memory is a strategic asset that, if successfully managed, can yield the following benefits:

- organization-wide communication support;
- access to decision-support modeling; and
- computerized aids for identifying and capturing individual learning experiences (Chen *et al.*, 2003; Olivera, 2000).

Teece *et al.* (1997) also observed that firm experiences influence firm behavior. Organizations that can effectively retrieve and manipulate past knowledge in and from their organizational memories are capable of enhanced or accelerated learning (Abel, 2008; Gagnon and Sheu, 2000), the development of innovative products or services (Moorman and Miner, 1997, 1998) and improved efficiency and superior customer services (Lai *et al.*, 2011). In a similar vein, Gong and Greenwood (2012) and Wexler (2002) emphasized that organizational memory allows employees to retrieve knowledge with less search effort, apply knowledge after a shorter learning period, rapidly develop coping strategies and increase firm economic value.

Summarizing the previous arguments, organizational memory is expected to have a positive effect on the four performance perspectives of the balanced scorecard (learning and growth, internal process, customer satisfaction and financial performance):

H1. Higher organizational memory levels will help to drive higher learning and growth (*H1a*), internal process (*H1b*), customer satisfaction (*H1c*) and financial performance (*H1d*).

Knowledge, ideas and understanding are intangible, and individuals should interact and share knowledge and ideas to establish new routines and mental models (Davenport and Prusak, 1998; Galunic and Rodan, 1998). A firm that promotes employees to contribute knowledge within groups and organizations is likely to generate new ideas and develop new business opportunities, thus facilitating innovation activities (Darroch and McNaughton, 2002). Specifically, a firm proficient in sharing knowledge is more likely to have unique and rare knowledge that is difficult for rivals to replicate, and hence has the potential to improve overall firm performance (Lin, 2007). Also, when employees are willing to cooperate with colleagues to contribute knowledge to the firm, they can generate collective learning and synergistic benefits through exchanging knowledge and resources, thereby increasing the potential for process improvement or novel products (Moustaghfir, 2008; Nonaka and Konno, 1998; Syed-Ikhsan and Rowland, 2004; Tsai, 2001). Effectively knowledge transfer enables employees to make fewer mistakes and reduce redundancy

(Grant, 1996; Gold *et al.*, 2001) and improve their work performance (Janz and Prasarnphanich, 2003). Previous studies also argued that knowledge-sharing networks are increasingly recognized as means of facilitating the development of new processes, products or services, thus creating economic value (Bierly *et al.*, 2009; Kamasak and Bulutlar, 2010; Rhodes *et al.*, 2008a; Zack *et al.*, 2009).

In sum, it is suggested that firms that are able to effectively share knowledge among employees are likely to achieve business performance across four balanced perspectives:

H2. Higher knowledge-sharing levels will help to drive higher learning and growth (*H2a*), internal process (*H2b*), customer satisfaction (*H2c*) and financial performance (*H2d*).

Firm capacity to absorb external knowledge determines knowledge renovation and reconfiguration, and thus, enhances business values (Lane *et al.*, 2006; Lichtenthaler, 2009). The basic concept of knowledge absorption was originally stated by Cohen and Levinthal (1990), who defined knowledge absorption as firm ability to identify, assimilate and exploit knowledge from its external environment. They also suggested that knowledge absorption is largely a function of the prior related knowledge of an organization and argued that it is critical to organizational learning activities. As modern literature on organizational learning emphasizes the importance of the ability to absorb external knowledge sources in organizational learning activities (Cohen and Levinthal, 1990; Daghfous, 2004; Garcia-Morales *et al.*, 2007; Levinthal and March, 1993), it is suggested that firms can better learn external knowledge when they better understand its value. Knowledge absorption, thus, is clearly related to organizational learning. Additionally, the incentives for absorbing external knowledge allow firms to expand their knowledge and skill base, improve their ability to assimilate, utilize future information and eventually achieve innovation performance and competitive advantage (Chen *et al.*, 2009b; Cockburn and Henderson, 1998; Fichman, 2004; Jantunen, 2005; Vinding, 2006). Likewise, in an uncertain environment, firms can apply their newly absorbed external knowledge in various ways, for instance, to replenish their knowledge base (Schilling, 1998), reconfigure existing capabilities (Pavlou and El Sway, 2006), increase customer relationship management performance (Chen and Ching, 2004) and create innovative products and services (Roberts *et al.*, 2012).

To summarize, the development of knowledge absorption can determine organizational adaptability (Daghfous, 2004), and thus, knowledge absorption is expected to positively impact the balanced scorecard outcomes:

H3. Higher knowledge absorption levels will help to drive higher learning and growth (*H3a*), internal process (*H3b*), customer satisfaction (*H3c*) and financial performance (*H3d*).

Knowledge receptivity describes the concept, whereby new ideas must be received positively and subsequently evaluated effectively and regularly (Wang *et al.*, 2008). With the openness of employees to new ideas considered a necessary initial condition for facilitating the extent of internal uptake (Hinduan *et al.*, 2009), it can be concluded that, to maximize work performance, employees must actively seek new and different experiences. As such, organizational learning is the insights gained through open minds and create receptivity to new ideas (Tobin, 1993). On the other hand, knowledge receptivity is similar to the term issue orientation (evaluation of a new idea strictly on its merits, regardless of the identify and status of the contributor) which helps to open communication channels (McGill *et al.*, 1993) and reinforces the mechanism for evaluating the quality and usefulness of the processed information (Hult, 2003). Prior research suggested that KM-oriented organizations with values oriented toward openness and support are prepared to develop behaviors through which employees accept more new ideas and creative thoughts, which, in turn, implies they can be more innovative, and respond more easily and rapidly to

changes and new market opportunities (Donate and Guadamillas, 2010; Earl, 2001; Garavelli *et al.*, 2004; Gold *et al.*, 2001; Song, 2008).

In sum, employees with strong receptiveness to new ideas are expected to be more likely to realize business performance in learning and growth, internal process, customer satisfaction and financial performance:

H4. Higher knowledge receptivity levels will help to drive higher learning and growth (*H4a*), internal process (*H4b*), customer satisfaction (*H4c*) and financial performance (*H4d*).

3.2 Interrelationships of the balanced scorecard outcomes

Kaplan and Norton (2004b) developed the balanced scorecard approach to highlight the links between leading indicators as performance-driven factors (non-financial performance) and lagging indicators as results' measurements (financial performance). Huang *et al.* (2007) also suggested that the cause-effect relationship of the balanced scorecard perspectives should be clearly linked to firm financial targets. However, no previous empirical studies have investigated the interrelationships among the four balanced scorecard perspectives in the context of KMO implementation.

Learning and growth describe employee capacity to manage a business and adapt to change. Firms have different degrees of effectiveness in structuring human resources that align with their abilities to mobilize and sustain procedural changes required to meet external environmental challenges (Chareonsuk and Chansa-Ngavej, 2010; Kaplan and Norton, 2004b). As Lee and Choi (2003) articulated, employees with T-shaped skills (combining broad skills and knowledge as the horizontal top part of the T with specialist skills in a specific functional area as the vertical bottom part of the T) may influence both the financial and non-financial performance of a firm through the intermediate outcome of business processes. Previous studies have suggested that KM initiatives are strongly related with organizational learning and growth, which, in turn, facilitate a formal learning organization (Yeung *et al.*, 1999; Wu and Kuo, 2012). Given the unpredictability of dynamic environment, the impact of learning and growth capabilities was clearly indicated in core business processes (Chareonsuk and Chansa-Ngavej, 2010; Huang *et al.*, 2007), both in results related to customer satisfaction (Gonzalez-Padron *et al.*, 2010; Lee *et al.*, 2011) and in financial results (Arh *et al.*, 2012; Lee *et al.*, 2012). Thus, employee competence and engagement is the most valuable firm asset, and it further indicates the potential links to internal process performance, customer satisfaction and financial performance.

Summarizing the previous arguments, KMO-enabled learning and growth are expected have a positive effect on internal process, customer satisfaction and financial performance:

H5. Higher KMO-enabled learning and growth will drive higher internal process (*H5a*), customer satisfaction (*H5b*) and financial performance (*H5c*).

The internal process involves a focus on critical business activities including internal process improvement and innovation performance. Improving internal process as a means of organizing and operating in an organization will increase firm flexibility by improvement of customer satisfaction and elimination of redundant and duplicated activities (Galbraith, 2002; Skrinjar *et al.*, 2008). A sustainable organizational advantage may be built through streamlined internal processes that derive from developing relationships with key customers (Hillman and Keim, 2001) and facilitating firm profitability (Davenport, 1999; Huang *et al.*, 2007; Quinn *et al.*, 1996; Wu and Kuo, 2012). Furthermore, organizational knowledge becomes visible through its application in various innovation processes and, once visible, can improve corporate performance (Gloet and Terziovski, 2004; Leonard and Sensiper, 1998; Lopez-Nicolas and Merono-Cerdan, 2011). Lee and Lee (2007) also examined KM effectiveness and revealed that KM capabilities influence customer satisfaction and financial performance through intermediate business processes.

In sum, it is expected that the potential links may be argued between internal process and customer and financial performance:

H6. Higher KMO-enabled internal process will drive higher customer satisfaction (*H6a*) and financial performance (*H6b*).

Customers are invaluable and crucial success assets in organizations because acquiring new customers is nearly five times more costly than retaining existing ones. Effective knowledge gathered from customers can be used to customize products or services based on individual customer needs and preferences and also to offer new products or services in response to changing and new needs (Bose and Sugumaran, 2003; Lee and Yang, 2000). Firms able to integrate customer knowledge into customer relationship management and maintain more satisfied and loyal customers allow companies to improve business performance, for example, through increased revenue, market share and profitability. Some studies have identified a significant relationship between customer satisfaction and financial performance, including Banker *et al.* (2000), Chareonsuk and Chansa-Ngavej (2010) and Ittner and Larcker (1998). In a similar vein, as discussed in previous research, when a company improves customer relationships through KMO implementation it reaps direct financial outcomes (Gonzalez-Padron *et al.*, 2010).

In sum, it is suggested that better KMO-enabled customer satisfaction leads to better financial performance:

H7. Higher KMO-enabled customer satisfaction will drive higher corporate financial performance.

4. Research methodology

4.1 Sample and data collection

This study mainly explores the impact of KMO dimensions on balanced scorecard outcomes. The firms that qualified for this study must emphasize investments in KM infrastructures and have considerable experience in KM projects. Thus, this study assumes that larger firms are more likely to have these experiences. A sample frame was assembled from the list of the top 1,600 Taiwanese firms published by Common Wealth Magazine, which contains 1,000 manufacturing, 500 retail/wholesale distributions and 100 financial service firms. To ensure that managers (currently and directly in charge of KM projects) received the questionnaire and maximize the response rate, six research assistants spent one month telephoning these 1,600 firms; they asked the target firms whether they have adopted KM and asked for the name of the managers (currently and directly in charge of KM projects) in their companies. Firms that were not adopters of KM or lacked permission to participate in the survey were removed from the list. As the result, about 1,028 firms across different industries formed the sampling frame for this study. The final questionnaires were mailed to the 1,028 managers who are responsible for KM projects in their companies.

To encourage response, follow-up letters were sent approximately three weeks after the initial mailing. Finally, this study received 253 questionnaires, 9 of which were incomplete and thus discarded. A total of 244 completed questionnaires provided the study with an effective response rate of approximately 23.7 per cent. The respondents came from six different industries, including computer and electronics (91), machinery (40), banking/insurance (22), transportation (13), retail/wholesale (71) and health/foods (7). The number in the parenthesis is the sample size in a particular industry. The average number of years that respondents had worked in their organizations was 14.1. The respondents themselves had senior representation, with 91 per cent assuming the position of chief information or knowledge officer, chief executive officer or human resource manager. These indicate that they were knowledgeable about their organizations and their reported data could reasonably represent the actual situation of their organizations.

Following Armstrong and Overton (1977), this study tested for the potential non-response bias. A comparative analysis of two descriptive variables (total assets and employee numbers) was conducted to see if responding firms have significantly different characteristics from non-respondents. The *t*-test results provide evidence that there was no-response bias problem in the sample (*p*-values are 0.138 and 0.121), suggesting that non-response bias was not a concern in this study.

4.2 Measures

To test the research model, a draft questionnaire was developed by identifying appropriate measurements from a comprehensive literature review. The existing scale was modified to make the measurements more suitable for the context of KMO implementation. With establishing the content validity, the questionnaire was refined through rigorous pre-testing. The pre-testing focused on instrument clarity, question wording and validity. During the pre-testing, four KM field experts were invited to comment on the questions and wordings. The comments of these four individuals then provided a basis for revisions to the construct measures. All measures were assessed with five-point Likert scales, ranging from "strongly disagree" to "strongly agree". The Appendix shows the items in the questionnaire.

The KMO scale is measured by four dimensions discussed previously: organizational memory, knowledge sharing, knowledge absorption and knowledge receptivity. Organizational memory refers to the building of a knowledge repository (such as shared databases, knowledge bases or even the Intranet) that facilitates knowledge searching, storage, and retrieval and promotes employees to communicate with colleagues. Accordingly, this construct uses the four items measures of organizational memory modified from Cross and Baird (2000) and Templeton *et al.* (2002). Knowledge sharing is the process through which employees share knowledge between individuals, across teams, throughout the organization and across the organization. This study used four items modified from Gold *et al.* (2001) to measure firm knowledge sharing. Knowledge absorption refers to the firm ability to recognize the value of external knowledge, assimilate it and apply it to commercial ends (Cohen and Levinthal, 1990). Knowledge absorption was measured using four items that assessed the extent to which knowledge is absorbed through market sources, business partners, education and research institutes and personnel flow (Smith, 1995). Knowledge receptivity is defined as the extent to which employees maintain a positive attitude toward new ideas and evaluate them fairly, effectively and regularly (Wang *et al.*, 2008). A five-item measure taken from the work of Nemeth (1997) and Popper and Lipshitz (1998) was modified to assess knowledge receptivity.

Consistent with the conceptualization in the balanced scorecard approach, this study examined the balanced scorecard outcomes along four dimensions: learning and growth, internal process, customer satisfaction and financial performance (Kaplan and Norton, 2004a). Based on Arora (2002) and Kaplan and Norton (2004a), learning and growth was measured using four items focused on improvements in employee skills, employee satisfaction, awareness of shared visions, objectives and values and new product or service development since KMO implementation. Internal process was assessed using four items derived from Arora (2002) and Gold *et al.* (2001). These items assessed the extent to which KMO have been successfully implemented to streamline corporate internal processes, improve product or service quality, innovate new products or services and rapidly commercialize new innovations. Five items used to capture the customer satisfaction were adapted from Moore *et al.* (2001) and Niven (2002). These items asked respondents to rate the degree to which KMO implementation resulted in improvements in market share, customer satisfaction, complainant response time, creation of new customers and customer retention. To measure financial performance, respondents were asked the extent to which they agree with the following statements: the implemented KMO had contributed to improve net benefit, economic value added, sales growth and return on investment (Anantatmula, 2007; Fugate *et al.*, 2009).

5. Results

This study used the SEM to test the research model, supported by LISREL software (version 8.8) (Joreskog and Sorbom, 1996). The LISREL software was chosen primarily because of its emphasis on the overall variance–covariance matrix and the overall model fit (Fornell and Bookstein, 1982). As the first step of the Anderson and Gerbing (1988) procedure, the measurement model used confirmatory factor analysis to test reliability and validity of the constructs. Then, the structural model examined the associations hypothesized in the decomposed model.

5.1 Measurement model

As shown in Table I, the measurement model provides a reasonably good fit for the data (χ^2 = 577.94; degrees of freedom [df] = 315; χ^2/df = 1.84; goodness-of-fit index [GFI] = 0.83; non-normalized fit index [NNFI] = 0.95; comparative fit index [CFI] = 0.96; root mean square error of approximation [RMSEA] = 0.071). Therefore, this study could proceed to evaluate the psychometric properties of the instrument in terms of construct reliability and convergent and discriminant validity. The internal reliability of the measurement model was tested using Cronbach's alpha. As shown in Table II, all Cronbach alpha values were higher than the minimum cutoff score of 0.70 (Nunnally and Bernstein, 1994). The convergent validity of constructs was assessed with three criteria recommended by Anderson and Gerbing (1988). First, all standardized factor loadings were significant at $p < 0.01$ (Gefen *et al.*, 2000). Second, composite reliabilities should exceed the recommended cut-off level of 0.70 (Hair *et al.*, 1998). Third, average variance extracted (AVE) by each construct should exceed 0.50 (Fornell and Larcker, 1981). As shown in Table II, all standardized factors loadings were significant ($p < 0.01$); the composite reliabilities of constructs were higher than 0.70 (0.79-0.91); and AVE for all constructs were above the 0.50 threshold (0.58-0.75). Table II also shows that the AVE of the individual constructs was greater than any squared correlation among constructs, confirming

Table I Fit indices for the measurement model and structural model

Type	*Index*	*Measurement model*	*Structural model*	*Recommended value for satisfactory fit for a model to data*
χ^2 test	χ^2	577.94	916.74	
	df	315	483	
	χ^2/df	1.84	1.90	≤3.00 (Bagozzi and Yi, 1988)
Absolute fit index	GFI (goodness-of-fit index)	0.83	0.85	≥0.80 (Seyal *et al.*, 2002)
Comparative fit index	NNFI (non-normed fit index)	0.95	0.94	≥0.90 (Bentler, 1988)
	CFI (comparative fit index)	0.96	0.94	≥0.90 (Bentler, 1988)
	RMSEA (root mean square effort of approximation)	0.071	0.074	≤0.08 (Hair *et al.*, 1998)

Table II Results of the measurement model

Construct	*Cronbach's α*	*Range of standardized path loadings*	*Convergent validity (p-value)*	*Composite reliability*	*Construct* 1	2	3	4	5	6	7	8
Organizational memory	0.87	0.77-0.89	All <0.01	0.88	0.67[a]							
Knowledge sharing	0.80	0.72-0.85	All <0.01	0.82	0.46	0.64[a]						
Knowledge absorption	0.74	0.76-0.81	All <0.01	0.79	0.50	0.45	0.58[a]					
Knowledge receptivity	0.88	0.82-0.90	All <0.01	0.88	0.42	0.28	0.20	0.71[a]				
Learning and growth	0.81	0.73–0.83	All <0.01	0.82	0.44	0.40	0.37	0.41	0.61[a]			
Internal process	0.90	0.84–0.92	All <0.01	0.91	0.47	0.51	0.65	0.40	0.56	0.75[a]		
Customer satisfaction	0.88	0.82–0.90	All <0.01	0.89	0.26	0.30	0.43	0.38	0.29	0.47	0.69[a]	
Financial performance	0.80	0.74-0.86	All <0.01	0.84	0.19	0.39	0.50	0.32	0.12	0.54	0.48	0.65[a]

Notes: [a]Diagonals represent the AVE; other entries represent the squared correlation among constructs

discriminant validity (Fornell and Larcker, 1981). In summary, the measurement model demonstrated adequate reliability, convergent validity and discriminant validity.

5.2 Common method bias

Because the data were self-reported, common method variance (CMV) is a possible concern (Podsakoff and Organ, 1986). Following Podsakoff *et al.* (2003), this study applied a single-informant approach to collect survey data, which make it necessary to examine for the possibility of common method bias. Harman's single-factor test was used to examine whether a single factor emerges from principal component analysis or if one factor overwhelmingly accounts for the majority of covariance among the variables in an unrotated factor analysis (Podsakoff *et al.*, 2003). All construct items were subjected to principal components factor analysis. The results indicated that multiple factors emerged to explain the data variance. Therefore, CMV does not appear to be a serious concern for this study. This is consistent with previous research (Carlo *et al.*, 2012) showing that CMV does not significantly affect KM studies based on single-source survey data.

5.3 Hypotheses testing

A similar set of fit indices was used to examine the structural model (Table I). The ratio of χ^2 to degrees-of-freedom was 1.90 (χ^2 = 916.74; degrees of freedom [df] = 483) for the structural model, again within the recommended level of 3. Comparison of other fit indices with their corresponding recommended values provided evidence of a good model fit (GFI = 0.85, NNFI = 0.94, CFI = 0.94, RMSEA = 0.074). Therefore, this study could proceed to examine the path coefficients of the structural model.

The research model was further evaluated by estimating the structural relationships among the research constructs. According the results shown in Table III, 19 direct path coefficients were statistically significant. Thus, *H1a-H1b*, *H2a-H2d*, *H3a-H3d*, *H4a-H4d*, *H5a-H5b*, *H6a-H6b* and *H7* were supported. Three of the 22 hypothesized paths, from organizational memory to customer satisfaction (*H1c*) and financial performance (*H1d*) and from learning and growth to financial performance (*H5c*), were not supported by statistically significant path coefficients. The R^2 values represent the explanatory power of the research model.

Table III Summary of statistically significant effects and hypotheses tests

Hypothesis	*Independent variable*	*Dependent variable*	*Direct effect*	*Indirect effect*	*Total effect*	*Supported?*
H1a	Organizational memory	Learning and growth	0.18*	–	0.18*	Yes
H1b		Internal process	0.16*	0.07	0.23*	Yes
H1c		Customer satisfaction	0.10	0.10	0.20*	No
H1d		Financial performance	0.08	0.09	0.17*	No
H2a	Knowledge sharing	Learning and growth	0.26**	–	0.26**	Yes
H2b		Internal process	0.43**	0.09	0.52**	Yes
H2c		Customer satisfaction	0.19*	0.21*	0.40**	Yes
H2d		Financial performance	0.21*	0.25**	0.46**	Yes
H3a	Knowledge absorption	Learning and growth	0.17*	–	0.17*	Yes
H3b		Internal process	0.25**	0.06	0.31**	Yes
H3c		Customer satisfaction	0.35**	0.13*	0.48**	Yes
H3d		Financial performance	0.22*	0.20*	0.42**	Yes
H4a	Knowledge receptivity	Learning and growth	0.29**	–	0.29**	Yes
H4b		Internal process	0.25**	0.10	0.35**	Yes
H4c		Customer satisfaction	0.30**	0.16*	0.46**	Yes
H4d		Financial performance	0.20**	0.21*	0.41**	Yes
H5a	Learning and growth	Internal process	0.36**	–	0.36**	Yes
H5b		Customer satisfaction	0.18*	0.11*	0.29**	Yes
H5c		Financial performance	0.06	0.15*	0.21*	No
H6a	Internal process	Customer satisfaction	0.31**	–	0.31**	Yes
H6b		Financial performance	0.21*	0.08	0.29**	Yes
H7	Customer satisfaction	Financial performance	0.25**	–	0.25**	Yes

Notes: *$p < 0.05$; **$p < 0.01$

The research model accounted for 52.8, 47.3, 36.6 and 41.9 per cent of the variance in learning and growth, internal process, customer satisfaction and financial performance.

Not all of the hypothesized relationships were significant, but several important direct and indirect relationships were discovered. The decomposition of direct, indirect and total effects can also be found in Table III. Based on Table III, organizational memory, knowledge sharing, knowledge absorption and knowledge receptivity affect the four balanced scorecard perspectives, either directly or indirectly. Results of statistical analysis also confirm the cause–effect relationships between the perspectives of the balanced scorecard.

6. Discussion

This study proposes and tests the decomposed model that examines the influence of KMO dimensions on organizational performance based on the balanced scorecard approach. The empirical analysis demonstrates several major findings. Interpretations based on these findings are discussed below. First, the results provide clear support for *H1a* and *H1b*, proposing the influence of knowledge stocks (i.e. stocks of organizational memory) on learning and growth (*H1a*, direct coefficient at 0.18) and internal process (*H1b*, direct coefficient at 0.16). The result is consistent with the finding that the previous or cumulative success of a firm can provide a basis for future success (Henderson and Cockburn, 1994). Another study by Wexler (2002) suggested that the codification, storage and reuse of past knowledge are necessary to stimulate employee thinking, problem-solving and skill level and to maintain a high-performance work environment. However, organizational memory did not show a statistically significant direct effect on both customer satisfaction (*H1c*) and financial performance (*H1d*), but the indirect effects are significant due to its mediation by improvement in learning and growth (indirect coefficient at 0.10) and internal process (indirect coefficient at 0.09). One possible explanation is if market turbulence reduces the value of organizational memory for customer and financial performance, in which case, organizations may need to turn to additional information mechanisms to supplement the value of memory. It can also be inferred that retrieving and manipulating past firm experience is important to facilitate continuous learning and innovation in business processes, and its consequent translation into improved customer satisfaction and financial performance. That is, repository-based organizational memory facilitates external market success when harnessed by instilling a learning culture and building innovative business processes.

In addition, concerning the relationship between the remaining three KMO dimensions (including knowledge sharing, knowledge absorption and knowledge receptivity) and balanced scorecard outcomes, all hypotheses are supported. In line with expectations, a positive relationship exists between knowledge sharing and all the four balanced scorecard perspectives (*H2a-H2d*). This result confirms the earlier observations of Wang and Wang (2012) that a knowledge-sharing culture contributes to firm operational and financial performance either directly or through improved innovativeness. Knowledge sharing also impacts internal processes more strongly than the other three performance perspectives (direct coefficient at 0.43 vs 0.26, 0.19 and 0.21). The reasons behind this result may be described as below. Knowledge must flow freely throughout the firm. Organizational knowledge is created and converted into products, services and processes by transforming general knowledge into new and valuable knowledge (Choy *et al.*, 2006). According to Darroch (2005), knowledge sharing is an important source of innovation, such as increased creativity and innovation in products and services, due to the existence of personalization KM strategy, thus improving operational efficiency. Therefore, to develop both product and operational innovation, firms should encourage employees to share tacit (skills or experience) and explicit (institutionalized approaches and practices) knowledge with each other.

Additionally, the results of this study add to the previous literature on the role of knowledge absorption in enabling firm performance (Chen *et al.*, 2009b; Fichman, 2004; Jantunen, 2005; Vinding, 2006). Previous studies did not examine the relationship between knowledge absorptive capacity and balanced scorecard outcomes. The results of this study showed that knowledge absorption directly and indirectly enhances organizational performance across the four balanced scorecard perspectives (*H3a-H3d*). Knowledge absorption through bringing in new knowledge from outside sources significantly affects both the internal and external aspects of performance improvement, including learning and growth, internal process and the customer and financial perspectives. A deeper analysis of the results highlights that knowledge absorption has a distinct impact on different balanced scorecard outcomes. Specially, knowledge absorption clearly strongly affects customer satisfaction (direct coefficient at 0.35), followed by internal process (direct coefficient at 0.25), financial performance (direct coefficient at 0.22) and learning and growth (direct coefficient at 0.17). This may be explained by the fact that knowledge absorption can benefit an organization by integrating external knowledge and then applying these knowledge resources to build marketing intelligence that meets customer needs and expectations. Similarly, Chen and Ching (2004) also found that knowledge absorption positively influences customer service and market-oriented product development. Firm ability to absorb external knowledge, thus, can be considered as a critical determinant of market orientation (such as proficiency of predevelopment activities, proficiency of marketing activities and protocol) and is the basis of firm creation of sustainable competitive advantages.

The results also show that knowledge receptivity has been reported to exhibit a similar impact pattern from the four balanced scorecard perspectives, learning and growth (direct coefficient at 0.29), internal process (direct coefficient at 0.25), customer satisfaction (direct coefficient at 0.30) and financial performance (direct coefficient at 0.20) (i.e. *H4a-H4d* were supported). This finding reinforces the concept of issue orientation, which proposes that employees tending to receive new ideas or different opinions can foster effective communication channels and, subsequently, enhance organizational performance (Hult, 2003; McGill *et al.*, 1993; Popper and Lipshitz, 1998). This view is consistent with previous studies, which posited that employee openness and transparency may lead to greater efficiency and effectiveness at both organizational and individual levels (Donate and Guadamillas, 2010; Garavelli *et al.*, 2004; Song, 2008). The research results have emphasized the amplifying role of knowledge receptivity in influencing financial and non-financial performance. This study confirms that establishing a regulatory system that strongly facilitates employee openness to new ideas and knowledge is crucial to improve employee learning outcomes, internal process, customer satisfaction and, ultimately, financial performance.

Concerning the interrelationships among the four balanced scorecard perspectives, the results demonstrated that most of the hypotheses were supported, except *H5c* (on the relationship between learning and growth and financial performance). Because KMO implementation can be viewed as an input to the process of knowledge production and creation, firms effectively exercise learning and growth, to make innovation and process performance more efficient (*H5a*, direct coefficient at 0.36). The redesign of operational and innovation process, ultimately, serves customers and increases customer satisfaction (*H6a*, direct coefficient at 0.31). Profit and revenue (corporate financial performance) are the final outcomes of this causal chain (*H7*, direct coefficient at 0.25). This result supports the findings by Wang and Chang (2005) and the significant correlations identified by Chareonsuk and Chansa-Ngavej (2010). The results also found that learning and growth directly influenced customer satisfaction (*H5b*, direct coefficient at 0.18), while internal process and financial performance are also directly linked (*H6b*, direct coefficient at 0.21). Even though the direct effect of learning and growth on financial performance (*H5c*) did not appear significant in this study, the indirect effects are significant and suggest that mediating factors play an important role. That is, KMO-enabled continuous learning and

growth in an organization can affect financial performance through internal process and customer performance (indirect coefficient at 0.15). It is possible to infer that an organization must develop effective learning activities to encourage innovative thinking among employees and gain greater customer satisfaction, and its consequent translation into improved financial performance. Consequently, the empirical results show that non-financial performance measures (i.e. learning and growth, internal process and customer satisfaction) directly and indirectly affect financial performance through cause-and-effect relationships.

7. Conclusions

7.1 Theoretical contributions

To the best of our knowledge, this study is the first study to theoretically specify or empirically test the relationships between KMO dimensions and the balanced scorecard outcomes by integrating three theoretical perspectives – knowledge-based view, organizational sensemaking view and balanced scorecard approach. More recently, some studies empirically discussed the effects of KMO on organizational performance (Wang *et al.*, 2008, 2009; Wang and Lin, 2013). However, few researches link individual KMO dimensions and the balanced scorecard outcomes from a holistic perspective. For these reasons, this study developed and validated the decomposed model to examine the influence of four dimensions of KMO (organizational memory, knowledge sharing, knowledge absorption and knowledge receptivity) on balanced scorecard outcomes (learning and growth, internal process, customer satisfaction and financial performance). This study is significant because it proposes theoretical foundation to investigate the consequences of individual KMO dimensions from balanced scorecard perspectives, and thus, contributes to the KM literature.

Compared with the existing literature, this study has conceptualized the linkages between KMO and organizational performance, and has further given more specific detail by dividing KMO into four dimensions, and by assessing organizational performance using four balanced scorecard perspectives. Consistent with the organizational sensemaking view, the findings have emphasized the critical role of organizational inside–out capabilities (such as KMO) in maximizing overall organizational performance. The results strongly support that knowledge sharing, knowledge absorption and knowledge receptivity differently influence the four balanced scorecard perspectives. Particularly, knowledge sharing has greater impact on internal process, while knowledge absorption more strongly impacts customer satisfaction. Few studies have decomposed the effects of individual KMO dimensions in relation to the balanced scorecard outcomes. The findings further suggest that the decomposed approach helps to understand the complex relationships embodied in the KMO–performance link, which cannot be surmised using a composite model. Therefore, the decomposed model can provide an alternative theoretical model for research aimed at acquiring an in-depth understanding of KM effectiveness, as opposed to achieving parsimony or focusing on main effects.

Finally, the empirical evidence also demonstrates the cause-and-effect relationships among different balanced scorecard outcomes. Although organizational performance is ultimately the financial goal within the context of KMO implementation, this study emphasizes the importance of intermediate output measures, such as non-financial performance (learning and growth, internal process and customer satisfaction). This opens an opportunity for further research on performance improvement from firm KMO implementation, based on the assumed linkage between non-financial and financial performance measures.

7.2 Implications for practice

The findings have a number of implications for managers. First, this study indicates that knowledge stocks (i.e. stocks of organizational memory) do not directly influence external

marketing success (i.e. customer satisfaction, market orientation and financial performance). Firms should first build knowledge repositories (such as shared databases, knowledge bases or even the intranet) to improve internal organizational performance (i.e. improvement in internal process and learning and growth) and then achieve customer and financial performance. One important implication is that leveraging knowledge stocks (i.e. stocks of organizational memory) is probably the safest route to continuous process improvement and incremental organizational product or service innovation. Managers should understand that the accumulative stock of existing knowledge can realize innovation benefits, but it is not enough to fully achieve customer and financial performance. That is, in an increasingly dynamic environment, the building of internal knowledge stocks is likely insufficient, but knowledge must be moved between a firm and external entities (e.g. customers, business partners and education and research institutes) (i.e. building knowledge flows) to achieve increased customer satisfaction and financial performance.

More importantly, the strong relationships between knowledge flows (including the transfer and absorption of knowledge within and outside the organization) and all the four balanced scorecard outcomes have important implications for managers. To improve the overall organizational performance (including learning and growth, internal process, customer satisfaction and financial performance), firms must foster increased knowledge flows both within and between firms. The findings reveal that knowledge sharing appears to be the most important driver of internal process performance, while knowledge absorption appears to be the strongest predictor of customer satisfaction. Managers should encourage employees to share their experiences and think together to cultivate a knowledge-sharing work environment when the organizational goal is to pursue innovative improvements in its processes, products and services. Managers should also encourage employees to absorb external knowledge, which will enable a market-oriented firm to become proactive both in how it serves its customers and how it develops marketing strategies.

Additionally, knowledge receptivity is important in ensuring that KM contributes to performance improvement and to firm ability to provide the "soft" KM mechanisms, such as trust, respect, consideration and open communication; it is an essential aspect that firms must encourage. Ultimately, employee trust and openness at work first improve learning and innovation performance, and then enhance firm profitability. Organizations focused on achieving KMO implementation success as enabled through their employees, besides a solid innovation process that fosters long-term production and profitable growth, should focus on recruiting and developing key employees that have a willingness to receive new ideas or different opinions and a strong thirst for organizational knowledge. Managers should also encourage discussion and openness to new and different ideas, which is conducive to interpersonal communication and the integration of organizational knowledge into effective firm growth and performance. For example, managers in knowledge-intensive organizations should consider employee positive and open attitudes in the workplace as the key ingredient to organizational success, which enables the balanced scorecard outcomes from KM activities.

Finally, managers should be aware of the interrelationships among the four balanced scorecard perspectives through the development of KMO. The results show that, with the exception of learning and growth, internal process and customer satisfaction have direct effects on firm financial performance. Although learning and growth do not directly impact financial performance, they do directly affect other non-financial performance measures, which, in turn, affect financial performance. Therefore, KM-enabled learning and growth environment can be viewed as the primary leading factor into which management should put the most effort. Managers must also consider the time-lag effect between KMO and the balanced scorecard outcomes. Maximizing financial performance requires an extended period of time for successful implementation of KMO. Considering how performance

evaluation is steadily used as an important managerial tool affecting the development of various KM strategies, the time-lag effect needs to be properly integrated to effectively link KMO with corresponding observed performance effects.

7.3 Limitations and future research

Despite some intriguing findings, the results of this study should be interpreted with caution due to the following limitations. First, because the data set is cross-sectional and not longitudinal, the posited casual relationships could only be inferred rather than proven. Future research should collect longitudinal data to determine the causal links more explicitly. Second, this study adopted the balanced scorecard approach (Kaplan and Norton, 2004a) and viewed organizational performance from four perspectives: learning and growth, internal process, customer satisfaction and financial performance. Sabherwal and Becerra-Fernandez (2003) argued that KM effectiveness should be assessed on three levels, namely, the individual, group and organizational levels. Future studies can test how different KMO dimensions affect perceived individual-, group- and organizational-level KM effectiveness, and thus gain a deeper understanding of the consequences of a well-organized KMO implementation. Third, a limitation of the research model is that we do not provide cross-industry comparisons. Choi and Lee (2003) found that different types of industries (such as manufacturing and non-manufacturing industries) differ in their KM styles implementation. Knowledge of how industry-specific differences affect organizational performance through KM efforts will heighten the generalizability of KM research. Finally, the sample was drawn from Taiwanese managers. Hence, the research model should be tested further using samples from other countries, as the findings may be influenced by cultural differences between Taiwan and other countries, and further testing, thus, would provide a more robust test of the hypotheses. However, it may provide a fundamental reference for firms located in other areas or countries with similar environments to Taiwan.

References

Abel, M.H. (2008), "Competencies management and learning organizational memory", *Journal of Knowledge Management*, Vol. 12 No. 6, pp. 15-30.

Anantatmula, V.S. (2007), "Linking KM effectiveness attributes to organizational performance", *VINE: The Journal of Information and Knowledge Management Systems*, Vol. 37 No. 2, pp. 133-149.

Anderson, J.C. and Gerbing, D.W. (1988), "Structural equation modeling in practice: a review and recommended two-step approach", *Psychological Bulletin*, Vol. 103 No. 3, pp. 411-423.

Andreeva, T. and Kianto, A. (2012), "Does knowledge management really matter? Linking knowledge management practices, competitiveness and economic performance", *Journal of Knowledge Management*, Vol. 16 No. 4, pp. 617-636.

Ardichvili, A., Page, V. and Wentling, T. (2003), "Motivation and barriers to participation in virtual knowledge-sharing communities of practice", *Journal of Knowledge Management*, Vol. 7 No. 1, pp. 64-77.

Argote, L. (1999), *Organizational Learning: Creating, Retaining and Transferring Knowledge*, Kluwer, Norwell.

Arh, T., Blazic, B.J. and Dimovski, V. (2012), "The impact of technology-enhanced organisational learning on business performance: an empirical study", *Journal of East European Management Studies*, Vol. 17 No. 3, pp. 369-384.

Armstrong, J.S. and Overton, T.S. (1977), "Estimating non-response bias in mail surveys", *Journal of Marketing Research*, Vol. 14 No. 3, pp. 396-402.

Arora, R. (2002), "Implementing KM – a balanced score card approach", *Journal of Knowledge Management*, Vol. 6 No. 3, pp. 240-249.

Bagozzi, R.P. and Yi, Y. (1988), "On the evaluation of structural equation model", *Journal of Academy of Marketing Science*, Vol. 16 No. 1, pp. 74-94.

Banker, R.D., Potter, G. and Srinivasan, D. (2000), "An empirical investigation of an incentive plan that includes nonfinancial performance measures", *Accounting Review*, Vol. 75 No. 1, pp. 65-92.

Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-120.

Bentler, P.M. (1988), *Theory and Implementation of EQS: A Structural Equation Program*, Sage, Newbury Park, CA.

Bierly, P.E. III, Damanpour, F. and Santoro, M.D. (2009), "The application of external knowledge: organizational conditions for exploration and exploitation", *Journal of Management Studies*, Vol. 46 No. 3, pp. 481-509.

Bogner, W.C. and Barr, P.S. (2000), "Making sense in hypercompetitive environments: a cognitive explanation for the persistence of high velocity competition", *Organization Science*, Vol. 11 No. 2, pp. 212-226.

Bose, R. (2004), "Knowledge management metrics", *Industrial Management & Data Systems*, Vol. 104 No. 6, pp. 457-468.

Bose, R. and Sugumaran, V. (2003), "Application of knowledge management technology in customer relationship management", *Knowledge and Process Management*, Vol. 10 No. 1, pp. 3-17.

Carlo, J.L., Lyytinen, K. and Rose, G.M. (2012), "A knowledge-based model of radical innovation in small software firms", *MIS Quarterly*, Vol. 36 No. 3, pp. 865-895.

Chang, S.C. and Lee, M.S. (2008), "The linkage between knowledge accumulation capability and organizational innovation", *Journal of Knowledge Management*, Vol. 12 No. 1, pp. 3-20.

Chareonsuk, C. and Chansa-Ngavej, C. (2010), "Intangible asset management framework: an empirical evidence", *Industrial Management & Data Systems*, Vol. 110 No. 7, pp. 1094-1112.

Chen, J., Ted, E., Zhang, R. and Zhang, Y. (2003), "Systems requirements for organizational learning", *Communications of the ACM*, Vol. 46 No. 12, pp. 73-78.

Chen, J.S. and Ching, R.K.H. (2004), "An empirical study of the relationship of IT intensity and organizational absorptive capacity on CRM performance", *Journal of Global Information Management*, Vol. 12 No. 1, pp. 1-17.

Chen, L. and Mohamed, S. (2008), "Contribution of knowledge management activities to organizational business performance", *Journal of Engineering, Design and Technology*, Vol. 6 No. 3, pp. 269-285.

Chen, M.Y., Huang, M.J. and Cheng, Y.C. (2009a), "Measuring knowledge management performance using a competitive perspective: an empirical study", *Expert Systems with Applications*, Vol. 36 No. 4, pp. 8449-8459.

Chen, Y.S., Lin, M.J.J. and Chang, C.H. (2009b), "The positive effects of relationship learning and absorptive capacity on innovation performance and competitive advantage in industrial markets", *Industrial Marketing Management*, Vol. 38 No. 2, pp. 152-158.

Choi, B. and Lee, H. (2003), "An empirical investigation of KM styles and their effect on corporate performance", *Information & Management*, Vol. 40 No. 5, pp. 403-417.

Choy, C.S., Yew, W.K. and Lin, B. (2006), "Criteria for measuring KM performance outcomes in organizations", *Industrial Management & Data Systems*, Vol. 106 No. 7, pp. 917-936.

Cockburn, I.M. and Henderson, R.M. (1998), "Absorptive capacity, coauthoring behavior, and the organization of research in drug discovery", *Journal of Industrial Economics*, Vol. 46 No. 2, pp. 157-182.

Cohen, W. and Levinthal, D. (1990), "Absorptive capacity: a new perspective on learning and innovation", *Administrative Science Quarterly*, Vol. 35 No. 1, pp. 128-152.

Cross, R. and Baird, L. (2000), "Technology is not enough: improving performance by building organizational memory", *Sloan Management Review*, Vol. 47 No. 3, pp. 69-78.

Daft, R.L. and Weick, K.E. (1984), "Toward a model of organizations as interpretation systems", *Academy of Management Review*, Vol. 9 No. 2, pp. 284-295.

Daghfous, A. (2004), "Absorptive capacity and the implementation of knowledge-intensive best practice", *SAM Advanced Management Journal*, Vol. 69 No. 2, pp. 21-27.

Darroch, J. (2005), "Knowledge management, innovation and firm performance", *Journal of Knowledge Management*, Vol. 9 No. 3, pp. 101-115.

Darroch, J. and McNaughton, R. (2002), "Examining the link between knowledge management practices and type of innovation", *Journal of Intellectual Capital*, Vol. 3 No. 3, pp. 210-222.

Davenport, T.H. (1999), "Knowledge management and the broader firm: strategy, advantage, and performance", in Liebowitz, J. (Ed.), *Knowledge Management Handbook*, CRC Press, Boca Raton, FL, pp. 2-1-2-11.

Davenport, T.H., DeLong, D.W. and Beers, M.C. (1998), "Successful knowledge management projects", *Sloan Management Review*, Vol. 39 No. 2, pp. 43-57.

Davenport, T.H. and Prusak, L. (1998), *Working Knowledge: How Organizations Manage What They Know*, Harvard Business School Press.

Day, G.S. (1994), "The capabilities of market-driven organizations", *Journal of Marketing*, Vol. 58 No. 4, pp. 35-52.

DeCarolis, D.M. and Deeds, D. (1999), "The impact of stocks and flows of organizational knowledge on firm performance: an empirical investigation of the biotechnology industry", *Strategic Management Journal*, Vol. 20 No. 10, pp. 953-968.

Dierickx, I. and Cool, K. (1989), "Asset stock accumulation and sustainability of competitive advantage", *Management Science*, Vol. 35 No. 12, pp. 1504-1511.

Donate, M.J. and Guadamillas, F. (2010), "The effect of organizational culture on knowledge management practices and innovation", *Knowledge and Process Management*, Vol. 17 No. 2, pp. 82-94.

Donate, M.J. and Guadamillas, F. (2011), "Organizational factors to support knowledge management and innovation", *Journal of Knowledge Management*, Vol. 15 No. 6, pp. 890-914.

Earl, M. (2001), "Knowledge management strategies: toward a taxonomy", *Journal of Management Information Systems*, Vol. 18 No. 1, pp. 215-233.

Ferraresi, A.A., Quandt, C.O., dos Santos, S.A. and Frega, J.R. (2012), "Knowledge management and strategic orientation: leveraging innovativeness and performance", *Journal of Knowledge Management*, Vol. 16 No. 5, pp. 688-701.

Fichman, R.G. (2004), "Real options and IT platform adoption: implications for theory and practice", *Information Systems Research*, Vol. 15 No. 2, pp. 132-154.

Fornell, C. and Bookstein, F.L. (1982), "Two structural equation models: LISREL and PLS applied to consumer exit-voice theory", *Journal of Marketing Research*, Vol. 19 No. 4, pp. 440-452.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.

Foss, N.J. (2006), "Knowledge and organization in the theory of the multinational enterprise", *Journal of Management and Governance*, Vol. 10 No. 1, pp. 3-20.

Fugate, B.S., Stank, T.P. and Mentzer, J.T. (2009), "Linking improved knowledge management to operational and organizational performance", *Journal of Operations Management*, Vol. 27 No. 3, pp. 247-264.

Gagnon, R. and Sheu, C. (2000), "The impact of learning, forgetting and capacity profiles on the acquisition of advanced technology", *Omega: International Journal Management Science*, Vol. 20 No. 1, pp. 51-76.

Galbraith, J.R. (2002), *Designing Organizations: An Executive Guide to Strategy and Process*, Jossey-Bass, San Francisco, CA.

Galunic, D.C. and Rodan, S. (1998), "Resource recombinations in the firms: knowledge structures and the potential for Schumpeterian innovation", *Strategic Management Journal*, Vol. 19 No. 2, pp. 1193-1201.

Garavelli, C., Gorgoglione, M. and Scozzi, B. (2004), "Knowledge management strategy and organization: a perspective of analysis", *Knowledge and Process Management*, Vol. 11 No. 4, pp. 273-282.

Garcia-Morales, V.J., Llorens-Montes, F.J. and Verdu-Jover, A.J. (2007), "The effects of transformational leadership on organizational performance through knowledge and innovation", *British Journal of Management*, Vol. 19 No. 4, pp. 299-319.

Gefen, D., Straub, D.W. and Boudreau, M.C. (2000), "Structural equation modeling and regression: guidelines for research practice", *Communications of the Association for Information Systems*, Vol. 4 No. 7, pp. 1-70.

Gloet, M. and Terziovski, M. (2004), "Exploring the relationship between knowledge management practices and innovation performance", *Journal of Manufacturing Technology Management*, Vol. 15 No. 5, pp. 402-409.

Gold, A.H., Malhotra, A. and Segars, A.H. (2001), "Knowledge management: an organizational capabilities perspective", *Journal of Management Information Systems*, Vol. 18 No. 1, pp. 185-214.

Goll, I., Johnson, N.B. and Rasheed, A.A. (2007), "Knowledge capability, strategic change, and firm performance", *Management Decision*, Vol. 45 No. 2, pp. 161-179.

Gong, B. and Greenwood, R.A. (2012), "Organizational memory, downsizing, and information technology: a theoretical inquiry", *International Journal of Management*, Vol. 29 No. 3, pp. 99-109.

Gonzalez-Padron, T.L., Chabowski, B.R., Hult, G.T.M. and Ketchen, D.J. Jr (2010), "Knowledge management and balanced scorecard outcomes: exploring the importance of interpretation, learning and internationality", *British Journal of Management*, Vol. 21 No. 4, pp. 967-982.

Grant. R. (1996), "Toward a knowledge-based theory of the firm", *Strategic Management Journal*, Winter Special Issue, Vol. 17, pp. 109-122.

Gray, P.H. (2001), "The impact of knowledge repositories on power and control in the workplace", *Information Technology & People*, Vol. 14 No. 4, pp. 369-384.

Hair, J.F., Anderson, R.L. and Tatham, W.C. (1998), *Multivariate Data Analysis with Reading*, Prentice-Hall, Upper Saddle River, NJ.

Handzic, M. (2005), "Managing knowledge with technology: mission possible", in Handzic, M. (Ed.), *Knowledge Management Through the Technology Glass*, World Scientific, pp. 21-38.

Henderson, R. and Cockburn, I. (1994), "Measuring competence? Exploring firm effects in pharmaceutical research", *Strategic Management Journal*, Vol. 15, pp. 63-84.

Hillman, A.J. and Keim, G.D. (2001), "Shareholder value, stakeholder management, and social issues: what's the bottom line?", *Strategic Management Journal*, Vol. 22 No. 2, pp. 125-139.

Hinduan, Z.R., Wilson-Evered, E., Moss, S. and Scannell, E. (2009), "Leadership, work outcomes and openness to change following an Indonesian bank merger", *Asia pacific Journal of Human Resources*, Vol. 47 No. 1, pp. 59-78.

Huang, H.C., Chu, W. and Wang, W.K. (2007), "Strategic performance measurement and value drivers: evidence from international tourist hotels in an emerging economy", *The Service Industries Journal*, Vol. 27 No. 8, pp. 1111-1128.

Huber, G. (1991), "Organizational learning: the contributing processes and the literatures", *Organization Science*, Vol. 2 No. 1, pp. 88-115.

Hult, G.T.M. (2003), "An integration of thoughts on knowledge management", *Decision Sciences*, Vol. 34 No. 2, pp. 189-196.

Ittner, C.D. and Larcker, D.F. (1998), "Are nonfinancial measuring leading indicators of financial performance? An analysis of customer satisfaction", *Journal of Accounting Research*, Vol. 36 No. 3, pp. 1-35.

Jantunen, A. (2005), "Knowledge-processing capabilities and innovative performance: an empirical study", *European Journal of Innovation Management*, Vol. 8 No. 3, pp. 336-349.

Janz, B.D. and Prasarnphanich, P. (2003), "Understanding the antecedents of effect knowledge management: the importance of a knowledge-centered culture", *Decision Sciences*, Vol. 34 No. 2, pp. 351-384.

Jayasingam, S., Ansari, M.A., Ramayah, T. and Jantan, M. (2013), "Knowledge management practices and performance: are they truly linked?", *Knowledge Management Research & Practice*, Vol. 11 No. 3, pp. 255-264.

Johannessen, J.A., Olsen, B. and Olaisen, J. (1999), "Aspects of innovation theory based knowledge management?", *Journal of International Management*, Vol. 19 No. 2, pp. 121-139.

Johnson, J. and Paper, D.J. (1998), "An exploration of empowerment and organizational memory", *Journal of Management Issues*, Vol. 10 No. 4, pp. 503-519.

Joreskog, K.G. and Sorbom, D. (1996), *LISREL 8 User's Reference Guide*, Scientific Software International, Chicago, IL.

Kamasak, R. and Bulutlar, F. (2010), "The influence of knowledge sharing on innovation", *European Business Review*, Vol. 22 No. 3, pp. 306-317.

Kaplan, R.S. and Norton, D.P. (1996), *The Balanced Scorecard: Translating Strategy Into Action*, Harvard Business School Press, Boston, MA.

Kaplan, R.S. and Norton, D.P. (2000), "Having trouble with your strategy? The map it", *Harvard Business Review*, Vol. 78 No. 5, pp. 167-176.

Kaplan, R.S. and Norton, D.P. (2004a), "Measuring the strategic readiness of intangible assets", *Harvard Business Review*, Vol. 82 No. 2, pp. 52-63.

Kaplan, R.S. and Norton, D.P. (2004b), "The strategy map: guide to aligning intangible assets", *Strategy and Leadership*, Vol. 32 No. 5, pp. 10-17.

Knudsen, H.K. and Roman, P.M. (2004), "Modeling the use of innovations in private treatment organizations: the role of absorptive capacity", *Journal of Substance Abuse Treatment*, Vol. 26 No. 1, pp. 51-59.

Lai, M.C., Huang, H.C., Lin, L.H. and Kao, M.C. (2011), "Potential of organizational memory for creating service performance: a cross-level analysis", *Expert Systems with Applications*, Vol. 38 No. 8, pp. 10493-10498.

Lane, P.J., Koka, B.R. and Pathak, S. (2006), "The reification of absorptive capacity: a critical review and rejuvenation of the construct", *Academy of Management Review*, Vol. 31 No. 4, pp. 833-863.

Lee, C.C. and Yang, J. (2000), "Knowledge value chain", *Journal of Management Development*, Vol. 19 No. 9, pp. 783-793.

Lee, H. and Choi, B. (2003), "Knowledge management enablers, processes, and organizational performance: an integrative view and empirical examination", *Journal of Management Information Systems*, Vol. 20 No. 1, pp. 179-228.

Lee, S., Kim, B.G. and Kim, H. (2012), "An integrated view of knowledge management for performance", *Journal of Knowledge Management*, Vol. 16 No. 2, pp. 183-203.

Lee, Y.C., Chu, P.Y. and Tseng, H.L. (2011), "Corporate performance of ICT-enabled business process re-engineering", *Industrial Management & Data Systems*, Vol. 111 No. 5, pp. 735-754.

Lee, Y.C. and Lee, S.K. (2007), "Capabilities, processes, and performance of knowledge management: a structural approach", *Human Factors and Ergonomics in Manufacturing*, Vol. 17 No. 1, pp. 21-41.

Leonard, D. and Sensiper, S. (1998), "The role of tacit knowledge in group innovation", *California Management Review*, Vol. 40 No. 3, pp. 112-125.

Levinthal, D.A. and March, J.G. (1993), "The myopia of learning", *Strategic Management Journal*, Vol. 14, pp. 95-112.

Lichtenthaler, U. (2009), "Absorptive capacity, environmental turbulence, and the complementarity of organizational learning", *Academy of Management Journal*, Vol. 52 No. 4, pp. 822-846.

Lin, H.F. (2007), "Knowledge sharing and firm innovation capability: an empirical study", *International Journal of Manpower*, Vol. 28 No. 3, pp. 315-332.

Lopez-Nicolas, C. and Merono-Cerdan, A.L. (2011), "Strategic knowledge management, innovation and performance", *International Journal of Information Management*, Vol. 31 No. 6, pp. 502-509.

Lueg, R. and Julner, P. (2014), "How are strategy maps linked to strategic and organizational change? A review of the empirical literature on the balanced scorecard", *Corporate Ownership & Control*, Vol. 11 No. 4, pp. 439-446.

McGill, M.E., Slocum, J.W. and Lei, D. (1993), "Management practices in learning organizations", *Organizational Dynamics*, Vol. 22 No. 1, pp. 5-17.

Marr, B. (2004), "Measuring and benchmarking intellectual capital", *Benchmarking*, Vol. 11 No. 6, pp. 559-570.

Milliken, F.J. (1990), "Perceiving and interpreting environmental change: an examination of college administrators' interpretation of changing demographics", *Academy of Management Journal*, Vol. 33 No. 1, pp. 42-63.

Mills, A.M. and Smith, T.A. (2011), "Knowledge management and organizational performance: a decomposed view", *Journal of Knowledge Management*, Vol. 15 No. 1, pp. 156-171.

Moore, C., Rowe, B.J. and Widener, S.K. (2001), "HCS: designing a balanced scorecard in a knowledge-based firm", *Issues in Accounting Education*, Vol. 16 No. 4, pp. 569-601.

Moorman, C. and Miner, A. (1997), "The impact of organizational memory on new product performance and creativity", *Journal of Marketing Research*, Vol. 34 No. 2, pp. 91-106.

Moorman, C. and Miner, A. (1998), "Organizational improvisation and organizational memory", *Academy of Management Review*, Vol. 23 No. 4, pp. 698-723.

Moustaghfir, K. (2008), "The dynamics of knowledge assets and link with organizational performance", *Measuring Business Excellence*, Vol. 12 No. 2, pp. 10-24.

Neill, S., McKee, D. and Rose, G.M. (2007), "Developing the organization's sensemaking capability: precursor to an adaptive strategic marketing response", *Industrial Marketing Management*, Vol. 36 No. 6, pp. 731-744.

Nemeth, C.J. (1997), "Managing innovation: when less is more", *California Management Review*, Vol. 40 No. 1, pp. 59-74.

Niven, P.R. (2002), *Balanced Scorecard Step-by-Step: Maximizing Performance and Maintaining Results*, John Wiley & Sons, New York, NY.

Nonaka, I. and Konno, N. (1998), "The concept of 'Ba': building a foundation for knowledge creation", *California Management Review*, Vol. 40 No. 3, pp. 40-54.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.

Nunnally, J.C. and Bernstein, I.H. (1994), *Psychometric Theory*, 3rd ed., McGraw-Hill, New York, NY.

Olivera, F. (2000), "Memory systems in organizations: an empirical investigation of mechanisms for knowledge collection, storage and access", *Journal of Management Studies*, Vol. 37 No. 6, pp. 811-832.

Pavlou, P.A. and El Sway, O.A. (2006), "From IT leveraging competence to competitive advantage in turbulent environments: the case of new product development", *Information Systems Research*, Vol. 17 No. 3, pp. 198-277.

Pietrantonio, R. (2007), "Assessment of the knowledge management systems in public administrations of Southern Italy", *VINE: The Journal of Information and Knowledge Management Systems*, Vol. 37 No. 3, pp. 331-347.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903.

Podsakoff, P.M. and Organ, D.W. (1986), "Self-reports in organizational research: problems and prospects", *Journal of Management*, Vol. 12 No. 4, pp. 531-544.

Pollitt, C. (2009), "Bureaucracies remember, post-bureaucratic organizations forget?", *Public Administration*, Vol. 87 No. 2, pp. 198-218.

Popper, M. and Lipshitz, R. (1998), "Organizational learning mechanisms: a structural and cultural approach to organizational learning", *Journal of Applied Behavioral Science*, Vol. 34 No. 2, pp. 161-179.

Prieto, I.M. and Easterby-Smith, M. (2006), "Dynamic capabilities and the role of organizational knowledge: an exploration", *European Journal of Information Systems*, Vol. 15 No. 5, pp. 500-510.

Quinn, J.B., Anderson, P. and Finkelstein, S. (1996), "Managing professional intellect: making the most the best", *Harvard Business Review*, Vol. 74 No. 2, pp. 71-80.

Ranjit, M. (2004), "Knowledge management metrics", *Industrial Management & Data Systems*, Vol. 104 No. 6, pp. 457-468.

Rhodes, J., Hung, R., Lok, P., Lien, B.Y.H. and Wu, C.M. (2008a), "Factors influencing organizational knowledge transfer: implication for corporate performance", *Journal of Knowledge Management*, Vol. 12 No. 3, pp. 84-100.

Rhodes, J., Lok, P., Hung, R.Y.Y. and Fang, S.C. (2008b), "An integrative model of organizational learning and social capital on effective knowledge transfer and perceived organizational performance", *Journal of Workplace Learning*, Vol. 20 No. 4, pp. 245-258.

Roberts, N., Galhuch, P.S., Dinger, M. and Grover, V. (2012), "Absorptive capacity and information systems research: review, synthesis, and directions for future research", *MIS Quarterly*, Vol. 36 No. 2, pp. 625-648.

Sabherwal, R. and Becerra-Fernandez, I. (2003), "An empirical study of the effect of knowledge management processes at individual, group, and organizational levels", *Decision Sciences*, Vol. 34 No. 2, pp. 225-260.

Schilling, M.A. (1998), "Technological lockout: an integrative model of the economic and strategic factors driving technology success and failure", *Academy of Management Review*, Vol. 23 No. 2, pp. 267-284.

Seyal, A.H., Rahman, M.N. and Rahim, M.M. (2002), "Determinants of academic use of the Internet: a structural equation model", *Behaviour and Information Technology*, Vol. 21 No. 1, pp. 71-86.

Skrinjar, R., Bosilj-Vuksic, V. and Indihar-Stemberger, M. (2008), "The impact of business process orientation of financial and non-financial performance", *Business Process Management Journal*, Vol. 14 No. 5, pp. 738-754.

Smith, K. (1995), "Interactions in knowledge systems: foundations policy implications and empirical methods", *STI – Science, Technology Industry Review*, Vol. 16 No. 1, pp. 69-102.

Song, J.H. (2008), "The key to organizational performance improvement: a perspective of organizational creation", *Performance Improvement Quarterly*, Vol. 21 No. 2, pp. 87-102.

Spender, J.C. (1996), "Making knowledge: the basis of a dynamic theory of the firm", *Strategic Management Journal*, Vol. 17 No. 2, pp. 45-62.

Srivastava, R.K., Shervani, T.A. and Fahey, L. (1999), "Marketing, business processes, and shareholder value: an organizationally embedded view of marketing activities and the discipline of marketing", *Journal of Marketing*, Vol. 63, pp. 168-179.

Stankosky, M. (2005), *Creating the Discipline of Knowledge Management: The Latest in University Research*, Butterworth Heinemann.

Syed-Ikhsan, S.O. and Rowland, F. (2004), "Knowledge management in a public organization: a study on the relationship between organizational elements and the performance of knowledge transfer", *Journal of Knowledge Management*, Vol. 8 No. 2, pp. 95-111.

Teece, D.J., Pisano, G. and Shuen, A. (1997), "Dynamics capabilities and strategic management", *Strategic Management Journal*, Vol. 18 No. 7, pp. 509-533.

Templeton, G.F., Lewis, B.R. and Snyder, C.A. (2002), "Development of a measure for the organizational learning construct", *Journal of Management Information Systems*, Vol. 19 No. 2, pp. 175-218.

Thomas, J.B., Clark, S.M. and Gioia, D.A. (1993), "Strategic sensemaking and organizational performance: linking among scanning, interpretation, action, and outcomes", *Academy of Management Journal*, Vol. 36 No. 2, pp. 239-270.

Thomas, J.B., Sussman, S.W. and Henderson, J.C. (2001), "Understanding 'strategic learning': linking organizational learning, knowledge management, and sensemaking", *Organizational Science*, Vol. 12 No. 3, pp. 331-345.

Tiwana, A. (2004), "An empirical study of the effect of knowledge integration on software development performance", *Information and Software Technology*, Vol. 46 No. 13, pp. 899-906.

Tobin, D.R. (1993), *Re-Educating the Corporation: Foundations for the Learning Organization*, Oliver-Wright Publications, CO.

Tsai, W. (2001), "Knowledge transfer in intra-organizational networks: effects of network position and absorptive capacity on business unit innovation and performance", *Academy of Management Journal*, Vol. 44 No. 5, pp. 996-1004.

Vaccaro, A., Parente, R. and Veloso, F.M. (2010), "Knowledge management tools, inter-organizational relationships, innovation and firm performance", *Technological Forecasting & Social Change*, Vol. 77 No. 7, pp. 1076-1089.

Van den Hooff, B. and Van Weenen, F.D.L. (2004), "Knowledge sharing in context: the influence of organizational commitment, communication climate and CMC use on knowledge sharing", *Journal of Knowledge Management*, Vol. 8 No. 6, pp. 117-130.

Vinding, A.L. (2006), "Absorptive capacity and innovation performance: a human capital approach", *Economics of Innovation & New Technology*, Vol. 15 No. 4, pp. 507-517.

Walsh, J.P. and Ungson, G.R. (1991), "Organizational memory", *Academy of Management Review*, Vol. 16 No. 1, pp. 57-91.

Wang, C.L., Ahmed, P.K. and Rafiq, M. (2008), "Knowledge management orientation: construct development and empirical validation", *European Journal of Information Systems*, Vol. 17 No. 3, pp. 219-235.

Wang, C.L., Hult, G.T.M., Ketchen, D.J. and Ahmed, P.K. (2009), "Knowledge management orientation, market orientation, and firm performance: an integration and empirical examination", *Journal of Strategic Marketing*, Vol. 17 No. 2, pp. 99-122.

Wang, F.K., Means, T. and Wedman, J. (2003), "Flying the KITE (knowledge innovation for technology in education) through a case-based reasoning knowledge repository", *On the Horizon*, Vol. 11 No. 2, pp. 19-31.

Wang, W.Y. and Chang, C. (2005), "Intellectual capital and performance in causal models: evidence from the information technology industry in Taiwan", *Journal of Intellectual Capital*, Vol. 6 No. 2, pp. 222-236.

Wang, Y. and Lin, J. (2013), "An empirical research on knowledge management orientation and organizational performance: the mediating role of organizational innovation", *African Journal of Business Management*, Vol. 7 No. 8, pp. 604-612.

Wang, Z. and Wang, N. (2012), "Knowledge sharing, innovation and firm performance", *Expert Systems with Applications*, Vol. 39 No. 10, pp. 8899-8908.

Weick, K.E., Sutcliffe, K.M. and Obstfeld, D. (2005), "Organizing and the process of sensemaking", *Organization Science*, Vol. 16 No. 4, pp. 409-421.

Wexler, M.N. (2002), "Organizational memory and intellectual capital", *Journal of Intellectual Capital*, Vol. 3 No. 4, pp. 393-414.

Wu, I.L. and Kuo, Y.Z. (2012), "A balanced scorecard approach in assessing IT value in healthcare sector: an empirical examination", *Journal of Medical Systems*, Vol. 36 No. 6, pp. 3583-3596.

Xu, J. and Quaddus, M. (2012), "Examining a model of knowledge management systems adoption and diffusion: a partial least square approach", *Knowledge-Based Systems*, Vol. 27 No. 1, pp. 18-28.

Yeung, A.K., Ulrich, D.O., Nason, S.W. and Glinow, M.A. (1999), *Organizational Learning Capability*, Oxford University Press, New York, NY.

Zack, M., McKeen, J. and Singh, S. (2009), "Knowledge management and organizational performance: an exploratory analysis", *Journal of Knowledge Management*, Vol. 13 No. 6, pp. 392-409.

Zahra, S. and George, G. (2002), "Absorptive capacity: a review, reconceptualization, and extension", *Academy Management Review*, Vol. 27 No. 2, pp. 185-203.

Zheng, W., Yang, B. and McLean, G.N. (2010), "Linking organizational culture, structure, strategy, and organizational effectiveness: mediating role of knowledge management", *Journal of Business Research*, Vol. 63 No. 7, pp. 763-771.

Appendix. Scale items

KMO dimensions

Organizational memory. My organization builds a knowledge repository (such as shared databases, knowledge bases, or even the intranet) that [. . .]:

1. [. . .] facilitates employees to search for new knowledge.
2. [. . .] facilitates employees to store ideas and knowledge.
3. [. . .] facilitates employees to retrieve and use knowledge.
4. [. . .] promotes employees to communicate with colleagues.

Knowledge sharing. My organization [. . .]:

1. [. . .] has a process for sharing knowledge between individuals.
2. [. . .] has a process for sharing knowledge across teams.

3. [. . .] has a process for sharing knowledge throughout the organization.
4. [. . .] has a process for sharing knowledge among our business partners.

Knowledge absorption. My organization [. . .]:

1. [. . .] has a process for absorbing knowledge from market sources into the organization.
2. [. . .] has a process for absorbing knowledge from business partners into the organization.
3. [. . .] has a process for absorbing knowledge from education and research institutes into the organization.
4. [. . .] has a process for absorbing knowledge from personnel mobility into the organization.

Knowledge receptivity. In my organization [. . .]:

1. [. . .] employees who contribute new idea are invited to participate in future development and implementation of this new idea.
2. [. . .] employees hesitate to speak out their ideas because new ideas tend to be highly criticized or ignored. (Reverse coded)
3. [. . .] new ideas are evaluated equitably.
4. [. . .] employees evaluate ideas based on their merits, no matter who comes up with the ideas.
5. [. . .] employees evaluate new ideas rapidly on a regular basis.

Balanced scorecard outcomes

After the implementation of KMO, my organization has improved its ability to [. . .]:

Learning and growth

1. [. . .] improve employee skills.
2. [. . .] improve employee satisfaction.
3. [. . .] improve awareness of shared visions, objectives, and values.
4. [. . .] improve new product or service development to market.

Internal process

1. [. . .] streamline corporate internal processes.
2. [. . .] improve product or service quality.
3. [. . .] innovate new products or services.
4. [. . .] rapidly commercialize new innovations.

Customer satisfaction

1. [. . .] improve market share growth.
2. [. . .] increase customer satisfaction.
3. [. . .] improve customer complainant response time.
4. [. . .] create new customers.
5. [. . .] keep current customers.

Financial performance

1. [. . .] increase net benefit.
2. [. . .] improve economic value added.
3. [. . .] improve sales growth.
4. [. . .] increase return on investment.

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3. Hongbo Lyu, Zhiying Zhou, Zuopeng Zhang. 2016. Measuring Knowledge Management Performance in Organizations: An Integrative Framework of Balanced Scorecard and Fuzzy Evaluation. *Information* **7**:2, 29. [CrossRef]